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CHILLIES:—THEIR CULTIVATION AND USES.

Capsicum, *Linn.; Gen. Pl., 11., 892.*

(From "Economic Products of India.")

THE greatest confusion exists in Indian literature as to the cultivated species of Capsicum. Popularly the larger fruits are usually designated Capsicums, and the smaller Chillies. According to Firminger, the powdered seeds of the latter constitutes Cayenne pepper. That author, in his *Manual of Gardening for India*, states that there are a great many varieties of Capsicum grown in India, some of which are very ornamental when grouped together.

The writer can at most hope that he has thrown the various vernacular names approximately under their corresponding botanical species. Much remains still to be done in order to clear up the ambiguities which exists in the literature of the Indian Capsicums. Many of the vernacular names appear to be given to all the species alike.

Habitat.—A native of equinoctial America, most probably of Brazil. Commonly cultivated for its fruit throughout the plains of India, and on the lower hills such as in Kashmir, and in the Chenab valley up to altitude 6,500 feet. When grown on the hills it is said to be very pungent. There are seven varieties, differing chiefly in the length, shape and colour of the fruit, some being round, others oblong, obtuse, pointed or bifid, smooth or rugose; and red, white, yellow, or variegated. It is probable that most Indian authors have confused this species with C. minimum, which see.

History.—"This species has a number of different names in European languages, which all indicate a foreign origin, and the resemblance of the taste to that of pepper. In French it is often called *poivre de Guinee* (Guinea pepper), but also *poivre du Bresil, d'Inde* (Indian, Brazilian pepper), &c., denominations to which no importance can be attributed. Its cultivation was introduced into Europe in the sixteenth century. It was one of the peppers that Piso and Maxgraf saw grown in Brazil under the name *quija* or *quiya*. They say nothing as to its origin." (*DC. Orig. of Cult. Pl.*) Chillies are not mentioned by any Sanskrit writer, consequently their introduction into India must have taken place at a comparatively recent date. It is probable that the Portuguese brought the fruit from the West Indies. Up to the present time the cultivation of the plant is carried on more extensively at Goa than at any other place on the western coast, and capsicums are well-known in Bombay by the name of *Gowai mirchi* (Goa pepper)" (*Dr. Dymock, Mat Med. W. Ind.*). Hove alludes to Capsicum as grown in Bombay in 1787 and expresses no astonishment at its existence in India.

Cutivation of Capsicums.—"A light well-manured soil is the best for all kinds, in which the plants should be picked out at about four inches apart when they attain a growth of three inches; and afterwards put out into a bed of rich light earth when they attain six inches in height, giving them a good supply of water and keeping them clear from weeds" (*The Gardener*).

Medicine.—Dr. Stewart says that the fruit is used externally in the form of plasters and taken internally in cholera; it is eaten from a conviction that it counteracts the effects of bad climates.

As a drug, red pepper is considered by the natives as stomachic and stimulant, and is used externally as a rubefacient (*Dymock*). "It has been employed with success as a topical application to elongated uvula and relaxation of the pendulous veil of the palate. Made into a lozenge, with sugar and traga-

canth, it is a favourite remedy for hoarseness with professional singers and public speakers. In putrid sore-throat whether symptomatic or strictly local, gargles of an infusion of red pepper are often very usefully resorted to" (*O'Shaughnessy, Beng. Dispens.* 468). "It is employd in medicine in combination with cinchona in intermittent and lethargic affections and also in atonic gout. It is a valuable adjunct to bitter tonics, and other stimulants in weak states of the stomach; in cold leucophlegmatic habits, dyspepsia and flatulence, and as a gargle in relaxed states of the throat it is highly extolled and has also been used with success in the advanced stages of rheumatism. In native practice it is given, in conjunction with asafœtida and sweet flag root, in cholera. By German physicians it is supposed to be particularly injurious in gonorrhœa,' (*Murray's Pl, and drugs of Sind*).

Dr. Sakharam Arjun says that the fruit is used as a stimulant in snake-bite.

Chemical composition.—"Bucholz, in 1816, and about the same time Braconnot, traced the acridity of capsicum to a substance called *casicin*. It is obtained by treating the alcoholic extract of ether, and is a thick yellowish red liquid, but slightly soluble in water. When gently heated it becomes very fluid, and at a higher temperature is dissipated in fumes which are extremely irritating to respiration. It is evidently a mixed substance consisting of resinous and fatty matters.

"Felletar, in 1869, exhausted capsicum fruits with dilute sulphuric acid and distilled the decoction with potash. The distillate, which was strongly alkaline and smelt like *conine*, was saturated with sulphuric acid, evaported to dryness and exhausted with absolute alcohol. The solution, after evaporation of the alcohol, was treated with potash, and yielded by distillation a volatile alkaloid having the odour of conine.

"From experiments made by one of us (F.) we can fully confirm the observations of Felletar. We have obtained the volatile base in question, and find it to have the smell of conine. It occurs both in the pericarp and in the seeds, but in so small a proportion that we were unsuccessful in isolating it in sufficient quantity to allow of accurate examination.

"Dragendorf states (1871) that petroleum either is the best solvent for the alkaloid of capsicum; he obtained crystals of its hydrochlorate, the aqueous solution of which was precipitated by most of the usual tests, but not by tannic acid.

"The colouring matter of capsicum fruits is sparingly soluble in alcohol, but readily in chloroform. After evaporation an intensely red soft mass is obtained, which is not much altered by potash; it turns first blue, then black, with concentrated sulphuric acid, like many other yellow colouring substances. By alcohol chiefly *palmatic* acid is extracted from the fruit, as shown by Thresh in 1877.

"The fruits of Capsicum fastigiatum have a somewhat strong odour; on distilling consecutively two quantities, each of 50lb, we obtained a scanty amount of flocculent fatty matter which possesses an odour suggestive of parsley. Both this matter, as well as the distilled water, were neutral to litmus-paper and the water tasteless. We separated the latter and exposed the remaining greasy mass to a temperature of about 50°C., when it for the most part melted. The clear liquid on cooling solidified and now consisted of tufted crystals, which we further purified by recrystallization from alcohol. Thus about two centigrammes were obtained of a natural white stearoptene having a deciedly aromatic, not very persistent taste, and by *no means acrid*, but rather like that of essential oil of parsley. The crystals melted at 38°C. On keeping them for some days at the temperature of the water-bath, covered with a watch-glass, some drops of essential oil were volatilized, which had the same taste and did not solidify; the crystals were consequently accompanied by a liquid oil When kept for some days more in that condition, the crystals themselves began to be volatilized, and the part remaining behind acquired a brownish hue. This, no doubt, points out another impurity, as we ascertained by the following experiment. With boiling solution of potash, the stearoptene produces a kind of soap which on cooling yields a transparent jelly. If this is dissolved and diluted, it becomes turbid by addition of an acid. This pr bably depends upon the presence of a little fatty matter (a suggestion which is confirmed by the somewhat offensive smell given off by our stearoptene if it is heated in a glass tube.

"BUCHHEIM'S 'CAPSICOL' is in our opinion a doubtful substance.

"Thresh (1876-77) succeeded in isolating a well-defined, highly active principle, the *Capsaicin*, from the extract which he obtained by exhausting Cayenne pepper with petroleum. From the red liquor dilute caustic lye removes *capsaicin*, which is to be precipitated in minute crystals by passing carbonic acid through the alkline solution. They may be purified by recrystallizing them for either alcohol, either, benzine, glacial acetic acid, or hot bisulphide of carbon; in petroleum *capsaicin* is but very sparingly soluble, yet dissolves abundantly on addilition of fatty oil. The latter being present in the pericarp is the cause why *capsaicin* can be extracted by the above process.

"The crystals of *capsaicin* are colourless and answer to the formula $C_9H_{14}O_2$; they melt at 59°C., and begin to volatilize at 115°C.; but decomposition can only be avoided by great care. The vapours of *capsaicin* are of the most *dreadful aridity*, and even the ordinary manipulation of that substance requires much precaution. *Capsaicin* is not a glucoside: it is a powerful rubifacie t, and taken internally produces very violent burning in the stomach" (*Pharmacographia*),

Special Opinions.—§"Stimulant and rubefacient, useful in dyspepsia; recommended in infusion as an external application to the eye" *Assistant Surgeon Nehal Sing, Shaharanpur*). "Chiefly used as a condiment and considered to be stomachic" (*Assistant Surgeon Anund Chunder Mookerji, Noakhally*). "Antimalarious to a certain extent" (*H. D. Masani, Surgeon H. M.'s 30th N. I., Bombay Karachi*). "Carminative, cooling medicine. The decoction with opium and friend asafœtida seeds is used in cholera. In the form of gargle it is useful in stomatitis and sore-throat. It is an ingredient in what is called *masala* in the Decan, Guzerat, and Cutch" (*W Barren Surgeon H. M S. 25th N. L. I., Bombay Bhuj Cutch*). "The capsule is innocuous; the seeds, as well known are powerfully irritant" (*R. T. H. Morar*). Chillies are applied by natives to dog-bites. An infusion made with 4 drams of chillies and a bottle of boiling water has been found useful in severe sore-throat" (*Assistant Surgeon Bhagwan Dass, Rawal Pindi*), "In delirium tremens in 20-grain doses" (*Surgeon-Major George Cumberland Ross, Delhi*). "Is used in liniments as a rubefacient; in cholera pills with camphor and assafœtida; as an application to elongated uvula and relaxed throat it is very useful" (*A. Surgeon*). "Active principle, an acrid oil-capsaicin. In dyspepsia, a good pill is made with equal parts of capsicum, rhubarb, and ginger" *C. M. Russel Civil Surgeon Sarun Bengal* "Internally it has a stimulant action on the bowels and helps to relieve constipation" (*Surgeon-Major A. S. G. Fayakar Muskat*.

Food.—The fruit when green is used for pickling and when ripe is mixed with tomatos, &c., to make sauces. It is also dried and ground for use like Cayenne pepper (*Treasury of Botany*.)

The consumption of chillies is very great, and both rich and poor daily use them; they form the principal ingredient in all chutnies and curries; ground into a paste, between two stones, with a little mustard oil, ginger, and salt, they form the only seasoning which the millions of poor can obtain to eat with their rice (*Balfour's Cyclop.*) Dr. Dymock gives

the value of Ghati chillies at R3½ per maund, and Gowav, R2½ to 4 per maund of 28lb in Bombay.

Capsicum, fastigiatum, *Blume.* See C. minimum, *Roxb.*

C. frutescens, *Linn.*; *Fl Br. Ind. IV.*, *239.*

HABITAT.—An annual, cultivated throughout India. Supposed to have been recently, comparatively speaking, introduced from South America. According to the best authorities, this and the other species of Capsicum, now cultivated in India, have no Sanskrit names. Of the Indian cultivated species this is perhaps the commonest, as it is also the largest, being sometimes cultivated in the hedges around fields. It is grown during the cold weather on light sandy soil in most parts of the country, and especially so in Bengal, Orissa and Madras. The Fruit, when ripe, is generally of a bright red colour; it is then picked and laid out on mats to dry in the sun.

Opinions differ slightly as to the plants which afford Cayenne pepper. Speaking of this species, De Candolle says: "The great part of the so-called Cayenne pepper is made from it, but this name is given also to the product of other peppers. Roxburgh, the author who is most attentive to the origin of Indian plants, does not consider it to be wild in India" (*Orig. Cult. Pl*) Simmonds writes that "the Cayenne pepper of commerce is obtained chiefly from the pulverised chillies or fruit pods of one or two species of Capsicum (C. annuum, *Linn.*, and C. fastigiatum, *Blume*). So also in the *Kew Official Guide* (p. 100) the dried and pulverised rind of the pods of C. annuum and its allies is said to make the best Cayenne pepper.

MEDICINE.—Chillies are used as medicine in typhus and intermittent fevers and in dropsy; they are regarded as stomachic and rubefacient. In native practice they are prescribed in gout, dyspepsia, cholera, and ague *(Atkinson).*

SPECIAL OPINIONS.—§ "When taken in curry in unusual quantities, chillies cause, in many instances, great irritation and burning in the rectum, especially after defœcation, attended also with scalding and frequent desire to urinate; mixed with ginger and mustard, they form a powerful rubefacient paste" (*Assistant Surgeon Shib Chunder Bhattacharji, Chanda, Central Provinces*). "A dose of ten grains of finely powdered capsicum seed, given with an ounce of hot water, two or three times a day, sometimes shows wonderful effects in cases of delirium tremens" (*Surgeon R Gray, Lahore*) "Stimulant, aromatic, and stomachic. I use the tincture and powder largely in the preparation of cholera mixture and pills, also in gargles for sore-throat" (*Brigade-Surgeon S. M. Shircore, Murshedabad*) "A powerful stimulant used as a gargle in sore-throat, also in dyspepsia and loss of appetite" (*Brig.-Surgeon F H Thorton Monghir*).

Food.—In every Indian bazar chillies may be purchased although not natives of India, the cultivated forms, at the present date, are everywhere met with and constitute an indispensable ingredient in native curry. They are "much used for flavouring pickles. By pouring hot vinegar upon the fruits all the essential qualities are procured, which cannot be effected by drying them, owing to their oleaginous properties; hence chilli-vinegar is in repute as a flavouring substance. In Bengal the natives make an extract from the chillies which is about the consistence and colour of treacle. A form of soluble Cayenne was sent from British Guiana in 1867 in the collection forwarded to the Paris Exhibition" (*Simmonds, Trop, Agri, 480.*)

The pods are dried on a hot plate or in a slow oven and then pounded in a mortar. This powder is then passed through a handmill until it is brought to the finest possible state, thereafter it is well sifted and preserved in corked glass bottles for use (*Treasury of Botany.*)

Capsicum grossum, *Willd Fl. Br. Ind. IV. 239.*

BELL PEPPER.

Habitat.—Not much cultivated in India; native place uncertain.

Food.—Cultivated to a limited extent in gardens, but chiefly for Europeans, who either cut this capsicum in stews or have it openod, stuffed with certain spices, and pickled in vinegar. The thick fleshy skin is not so hot as that of the other species.

C. minimum, *Roxb.*; *Fl. Br. Ind., IV., 239*; *Wight Ic., t. 1617.*

BIRD'S-EYE CHILLI.

Habitat—Cultivated throughout India, but not extensively; closely resembles C. annuum, but is distinguished by the more acute corolla lobes, the smaller seeds, and by the pod being erect, nearly cylindrical and yellow when ripe. It is generally known as Bird's-eye Chilli. This "is found in many parts of India, principally in the southern districts, growing in waste places, gardens &c., in an apparently wild state. It is also found abundantly in Java and other parts of the Eastern Archipelago under similar conditions. There is, however, good reason to believe that, in common with the rest of the genus, it was originally brought from some part of the American Continent. It is now cultivated to a large extent in the tropics of both the old and new worlds" *(Bentley and Trimen.)*

Medicine.—The *Pharmacopœia of India* describes the fruit as an acrid stimulant. "In atonic dyspepsia, and in diarrhœa arising from putrid or crude ingesta in the intestines, and in the vomiting of bilious remittent fever, it acts beneficially. In scarlatina it has been used with great repute in the West Indies. In various forms of cynanche, and in hoarseness or aphonia, depending upon a relaxed condition of the *chordæ vocales*, it has been found a useful adjunct to gargles. As a rubefacient and counter-irritant, the bruised fruit, in the form of poultice, acts energetically; added to sinapisms it greatly increases their activity." Acts as an acrid stimulant, and externally as a rubefacient used in putrid sore-throat and scarlatina; also in ordinary sore-throat, hoarseness, dyspepsia, and yellow fever, and in diarrhœa occasionally also in piles" (*Baden Powell*).

"In *Scarlatina*, the following mixture has attained much repute in the West Indies: Take two table spoonsful of bruised Capsicum and two teaspoonsful of Salt; beat them into a paste and add half a pint of boiling water; when cold, strain and add half-a pint of Vinegar. Dose for an addult, one table-spoonful every four hours; to be diminished for children according to age or the severity of the attack. The same formula forms an excellent gargle in the *sore-throat which accompanies this disease* as well as in ordinary *relaxed, sore-throat, hoarseness* &c." (*Waring, Medicines.*)

Food.—This small "chilli" is rarely used by natives, but by Europeans is steeped in vinegar and mixed with salt; in this form it is employed as a seasoning in stews, chops &c.

(From "Treasury of Botany.")

CAPSICUM.—One of the genera of *Solanaceæ*, deriving its name from the Greek word signifying 'to bite,' in allusion to the hot pungent properties possessed by the fruits and seeds. The genus consists of annual or biennial plants, frequently with a somewhat woody and bushy stem; a wheel-shaped corolla; five stamens protruding from the corolla, their anthers converging at their points, and opening by longitudinal slits; and a two to four-celled ovary, becoming, when ripe, a membranous pod containing several seeds. The shape of the fruit varies very much in the different species of the genus.

C. annuum, a native originally of South America, but introduced into India and elsewhere, furnishes the fruits known as Chillies; these, as well as the fruits of *C. frutescens*, and several other species or varieties, are used to form Cayenne pepper. For this purpose the ripe fruits are dried in the sun or in an oven, and then ground to powder, which is mixed with a large quantity of wheat flour. The mixed power is then made into cakes with leaven, these are baked till they are as hard as biscuit, and are then ground and sifted. The Cayenne pepper of the shops is, however, usually largely adulterated

with red lead and other less objectionable substances. The hot taste seems to be due to a peculiar acrid fluid called *capsicin*, which is so pungent that half a grain of it volatilised in a large room, causes all who respire the contained air to cough and sneeze. It is remarkable that the narcotic properties, which are possessed by most of the *Solanaceæ* to a greater or less extent, are not present in *Capsicum* — though this is open to some doubt, as it is said that some of the American species have narcotic proderties residing in the pulpy matter in which the seeds are imbedded, this pulp being absent in those kinds which are used for their pungent properties.

Capsicum fruits are used medicinally, in powder or as a tincture, as an external application, or as a gargle in certain cases of sore throat, particularly those of a malignant character, and internally as a stimulant in cases of impaired digestion, &c. Several kinds are cultivated in this country, as objects of curiosity, and for the sake of their fruits. [M.T.M.]

The species of *Capsicum* are chiefly natives of the East and West Indies, China, Brazil, and Egypt, where they are much esteemed for their pungent fruit and seeds, which, under the name of Cayenne Pepper, or Chillies, form an indispensable condiment, which Nature herself appears to have pointed out to persons resident within the tropics. According to Sir R. Schomburgk, the natives in Guiana eat the fruit of these plants in such abundance as would not be credited by a European unless he were to see it (*Jour. Hort. Soc.* ii. 153). In Jamaica the species most esteemed is the Bonnet Pepper (*C. tetragonum*), the fruits of which are very fleshy, and have a depressed form, like a Scotch bonnet. The shrubby Capsicum, or Spur Pepper (*C. frutescens*), is a native of the East Indies, and has been in our gardens since 1656. It forms a dwarf bushy shrub, with white flowers, and bears numerous small oblong obtuse pods, which are very pungent, and in their green and ripe state are used for pickling, as well as for making Chilli vinegar. This is done by merely putting a handful of pods into a bottle, and afterwards filling it with best vinegar, which in several weeks will be fit for use. But the chief purpose for which this species is cultivated is for making Cayenne pepper, which is often prepared by drying the pods on a hot plate, or in a slow oven, and then pounding them in a mortar, and passing them through a hand-mill until the whole is reduced to the finest possible state. After this has been done, the powder is to be sifted through a thin muslin sieve, and preserved in well-corked glass bottles for use. The common annual Capsicum, or Guinea Pepper (*C. annuum*), was introduced into Europe by the Spaniards. It was cultivated in England in 1548, and is sufficiently hardy to thrive in summer against a south wall in the open air, and mature its fruit. The colour, direction, and figure of the latter is very variable—some being yellow, others red, and others black. In a green state they are used for pickling, and when ripe are mixed with tomatos, &c., to form sauces. They are also dried and ground for use like Cayenne pepper. The Berry-bearing Capsicum, or Bird Pepper (*C. baccatum*), is indigenous to both the East and West Indies, and has been grown in this country since 1731. Its pods are erect, roundish, egg-shaped, very pungent, and when ripe are dried and used for the same purposes as those of other kinds of *Capsicum*. They also form one of the chief ingredients in the preparation known in the West Indies as *man dram*, which is usually resorted to by those effected with loss of appetite or weak digestion, and consists of cucumbers sliced very thin, shallots or onions chopped very fine, a little lime juice and Madeira wine, to which is added a handful of the pods of this pepper, and the whole are then mashed together, and mixed with as much liquid as may be thought necessary. Besides the three species noticed as being the kinds most generally cultivated, there are many other species and varieties occasionally grown for the sake of their pods, all of which yield a warm acrid oil, which acts powerfully on the stomach, and is thought to correct flatulency, and assist digestion. [W.B.B.]

AGRICULTURAL EDUCATION IN GREATER BRITAIN.

PAPER READ BEFORE THE FOREIGN AND COLONIAL SECTION OF THE SOCIETY OF ARTS, ON TUESDAY, FEBRUARY 27, 1900.

BY R. HEDGER WALLACE.

(Continued from Vol. XX., page 7.)

It is a matter of regret to learn that agriculture is not yet taught in the schools of this colony, for, in the paper read at the "International Congress on Technical Education" by the Emigration Agent for the Colony of Queensland, it is stated that lessons in agricultre had been introduced into the programme of instruction for country schools, with practical lessons in horticulture, for the school children of Brisbane and suburbs. Queensland is, however, peculiarly situated, as within its borders both branches of agriculture are carried on—the tropical and the temperate.

The college lately established is near Brisbane, and the three years' course of study icludes the following subjects.—

First Year.—Agriculture, horticulture, dairying, carpentry (industrial), agriculture, horticulture, (lectures) arithmetic, book keeping, chemistry, drawing, English composition.

Second Year.—Agriculture, horticulture, dairying, blacksmithing, (industrial), agriculture, horticulture, dairying (lectures), anatomy and physiology, botany, chemistry, entomology, geology, physics, surveying.

Third Year.—Industrial (special work), agriculture (lectures), agricultural chemistry, bacteriology, botany landscape gardening, meterology, mechanics, veterinary science, zoology.

There are also four State Farms in Queensland, at Westbrook, Hermitage, Gindie, and Biggenden, and their object is to carry out experiments for the benefit of the farming community in the district where they are located. (Unlike the farms in New South Wales, facilities for students gaining experience is not afforded at these Queensland State Farms.) Agricultural education is also furthered by the employment of instructors in fruit culture, viticulture, tobacco culture, and coffee culture, and the issue of various publications.

Passing now to Victoria, it may be said that agricultulal education in this colony follows very much on the same lines as that of New South Wales. Agriculture can be taught in the State Schools. and it is an optional subject in some of the teachers examinations. It used to be taught in the State School Teachers' Training Institute, before that institution was abandoned. Lectures on dairying are being given at present in the country schools, and proving a success. Nothing however, has yet been done in regard to school gardens, or the practical demonstration of agricultural principles in rural schools, as is done in South Australia. In the Schools of Mines throughout the colony, both agriculture and agricultural chemistry may be taught, and the curriculum of the Victorian Technical Schools includes agriculture, fruit-growing, and veterinary science. A Royal Commission, I may note, has lately been appointed, and is now dealing with the present educational system of the colony, and investigating as to the best systems of teachnical and agricultural teaching, as found in Europe and America. The whole system of teaching in the colony is therefore likely soon to be re-modelled.

The interest of purely agricultural education are in this colony entrusted to a Council of Agricultural Education, which represents the Agricultural Societies and the Government. Two colleges have been established by this Council—one at Dookie, in the north-eastern district and near to Sheppartoin; the other at Longerenong, in the Wimmera district, and near to Horsham. The latter college, which is placed near the Mallee lands, and admirably adapted for demonstraining what can be done in farming with

irrigation, has been, however, closed for some time, but it seems to have been only a temporary measure, for I believe it is now again ready to receive students.

It was originally intended, I believe, to found two more colleges one in the south-eastern and the other in the south-western districts, but this intention has not been carried out. The great feature in the colleges controlled by the Council of Agricultural Education in Victoria is that the instruction is free, the only charge being for maintenance. It is optional with students to remain one or more sessions at the colleges, but before a student can obtain his diploma he must have been in attendance for at least two years, while the maximum term of attendance permitted is three years. The course of instruction is the same in both colleges, and comprises elementry chemistry, botany and geology, some agricultural chemistry and economic entomology, advanced English to the understanding of technical expressions, arithmetic, mensuration, surveying, book-keeping, practical work on the farm, instruction in field operations, the use of farm implements and machinery, and the management of stock. Very special prominence is given to practical work at these colleges, and half of the students' time is devoted to field work. All students must be over the age of fourteen on admission and each college has accomodation for forty students.

A new school of viticulture has recently been established at Rutherglen in the northeastern district and is directed by an expert from the college of viticulture at Montpelier, France. A school of horticulture has also been in operation for many years at the Government Horticultural Gardens at Burnley, near Melbourne. Here the number of students are limited to 25, and the term is also restricted to one year, the instruction being free. A Government scent farm was also carried on for some years to give instruction in scent flower farming, but is now closed for the time being, as sufficient interest was not taken in the industry. A small experimental tobacco farm has, however, been recently established near Wangaratta by the Government tobacco expert, who was engaged from the United States and for the past two years has been giving instruction to growers. It is now proposed, I am informed, to still further extend the scope of agricultural education by the establishment of a dairy and cheese school, and a large sum of money has recently been voted for the purpose, so that these institutions will probably be established shortly. Like the other colonies, Victoria also employs experts to give instruction in dairying, fruit growing, viticulture tobacco growing, and the cultivation of fibre and oil-producing plants, and issues bulletins.

Next I note what has been done in respect of agricultural education in the adjoining colony of South Australia. Though this colony extends through the continent, and within its boundaries you find tropical, subtropical, and temperate, cultivation, education in agriculture is limited to the southern portion of the colony. In reply to my enquiries, the Agent-General for the colony, who when in South Australia was mainly instrumental in introducing the teaching of agriculture into the State schools, was good enough to advise me that—

"(1) Agriculture is taught as a specific subject in the elementry state school, in the *country*. (2) There are no farm schools, but several secondary agricultural schools for lads of 12 or 13 years. (3) We have the Roseworthy Agricultural College, and one high technical school of agriculture. (4) The study is encouraged in primary schools, where teachings can rise the percentage of their results by teaching agriculture and similar subjects."

The technical school of agriculture mentioned was opened in 1898 in Adelaide. At this school the subjects taught are Euglsh literature, composition, advanced arithmetic, algebra, plane geometry, mensuration and land surveying, mechanical drawing agriculture (theoretical and practical) fruit culture,, and viticulture. For instruction in chemistry, physics and carpentery, the scholars attend the School of Mines. Students from the Teachers' Training College also attend this school to get from the master a practical insight into the methods of teaching agriculture, so that in due course they might be appointed to schools where instruction in agriculture is to form an important feature of the work. From the report of the South Australian Minister of Education for 1898, it seems that the Board of Inspectors in the colony are in favour of the teaching of agriculture in the schools. This deserves notice, for a study of the reports of the Departments of Education in the other colonies will show that a good deal of opposition to the introduction of agricultural teaching in these colonies has come from members of the Inspectorate.

Passing next to the technical schools in South Australia, their curriculum also includes wool sorting and dairy work as subjects of instruction. Turning now to purely agricultural education, like the other colonies already mentioned, South Australia has an Agricultural College, located at Roseworthy, about 35 miles from Adelaide. This college was opened in 1885, and the course of instruction includes practical agriculture, chemistry, botany, geology, surveying, levelling mensuration, book-keeping, entomology, and veterinary science, and also viticulture, œnology, fruit culture, and wool sorting. The course is a two years' one but students who fail to obtain a diploma may remain a third year. The age for admission is 14, and all students are required to take part in farm work; but only half the time considered necessary in the Victorian colleges to be devoted to practical farm work is insisted upon at Roseworthy. The laboratory and science teaching generally is however recognised to be at Roseworthy in advance of that at the Victorian institutions. Again, like the other colonies, South Australia employs experts to give instruction in viticulture, horticulture, and dairying, and publishes a journal.

The last colony on the Australian continent yet to be mentioned is Western Australia, the Agent General of which advises me that:—

"(1) Agriculture is partially taught in the State schools of Western Australia. (2) There are no farm schools in the colony. (3) At present no agricultural school exists, but the desirablity of establishing such a college has been brought before the Government. (4) The Educational Department encourages agricultural training in the State schools"

I have been unable, however, to learn in time or this paper how agricultural training is encouraged, and what methods of teaching agriculture, in the State schools of this colony, are employed.

Coming now to Tasmania, this colony has what is termed a "Practical School of Agriculture" at Ulverstone, on the north-west coast. This school is under the patronage of the Tasmanian Government and has been selected by that Government to afford technical instructions in agriculture in the colony, and is subsidised also by the Government in order that special classes may be held at a low fee open to farmers and others in the district. Unlike the other Australian agricultural schools or colleges, it is not a Government institution. The basis or foundation of school is the Ulverstone Grammar School to which first an agricultural side has been added for boys, and then a further addition of a distinct and separate branch, including a farm, for grown up students. Agriculture is not taught in the elementary schools of this colony, but theoretical tuition in agricultural chemistry is sometimes given in the higher grade schools or colleges, though nothing of a very definite nature is taught. Occasionally lecturers are engaged to travel through the country and give instruction on agricultural subjects. There is also what is practically a department of Agriculture, which issues publications, and can command some scientific advice.

In New Zealand the circumstances are different, for agriculture can be taught in the elementry schools in

Standards IV., V., and VI., and its teaching is encouraged by a provision that "if agricultural chemistry be efficiently taught, no other elementary science shall be required in these Standards." I have already drawn attention to the favourable opinion held of agriculture as a subject of instruction by the South Australian Board of School Inspectors, but in the report of the New Zealand Education Department, 1889, I find the reverse of the picture. The Chief Inspector, for instance, in his report, says, "The general science course, again being taken up in a good many schools where agricultural science was formerly preferred. This is a change to be welcomed, for the educative value of the two courses, and the facilities they offer for experimental illustration, are very unequal." In the same paragraph he further states that "with history treated only as a subject for reading, and the extravagances of the syllabus in geography, higher arithmetic, and agricultural, science rigidly pruned, there would be time to do honest educational work all round, and little excuse, but incap city for not doing it." This is, of course, a matter for debate among experts. I simply regard it from what might be termed the ordinary ratepayers' point of view, and would say that the teaching of agriculture in the schools cannot be successful when the subject is regarded by the inspectorate in the light these extracts indicate. Like the neighbouring colonies, New Zealand also has an Agricultural College at Lincoln, near Christchurch. This college is one of the affiliated colleges of the University of New Zealand, which grants certificates and a degree (Bachelor of Science) in agriculture to those students who follow the prescribed course and pass the necessary examinations. For the degree in agriculture a student must first pass the matriculation examination, and attend two years at a university college and then two succeeding years at this Agricultural College. The course of instruction at Lincoln extends over two years, and students are not received if under sixteen years of age. The students' time is also equally divided between lectures and practical work as follows:—On one day the first-year students receive lectures, and the second-year students work on the farm; on the following day the second-year students receive lectures, and the first-year students work on the farm, and so on. The subjects taught are agriculture, chemistry, general and agricultural; botany, general and practical; entomology, general and agricultural; geology physiography, and meteorology; veterinary science, applied mathematics and mechanics, land surveying and levelling, drawing, and book-keeping.

In addition to this general agricultural college, a dairy school, is about to be established, and instructors from Canada have already been appointed.

CULTIVATION OF PEPPER IN THE BOMBAY PRESIDENCY.

A *Note by* J. W. Mollison, Esq., M.R.A.C., *Deputy Director of Agriculture, Poona. To which is added an account of Manures used in Spice Gardens.*

The two useful papers, by Mr. Mollison, given in these pages, are reproduced from the *Bombay Bulletin* by the courteous permission of the Survey Commissioner and Director, Land records and Agriculture, Bombay.

The commercial product here dealt with is the dried fruit of a vinelike plant which is found wild in the forests of Malabar and Travancore. The plant is cultivated largely in Southern India, Siam, Malay, Cochin-China, and other tropical parts with moist hot climates. A rainfall of 100 inches or more appears to be necessary. The plant is a large climber. The leaves are glossy, acute, cordate. The flowers are pendulous spikes and the fruit red berries, the size of peas in racemes. The berries are fleshy. The pulp covers a soft stone. The plants in climbing, cling by adventitious roots very closely to any support. In the Kanora gardens pepper is trained on the *supari* palm trees.

How Propagated.—The plant is propagated by layering or from cuttings. The former is the preferable plan. When the betel palms have been seven or eight years permanently planted, pepper is planted at the roots of the trees. If a long healthy vine, from an established plant, can be stretched to reach the root of the betel palm, this vine is layered in the leaf-mould manure which surrounds the roots of the palm. The pepper vine takes root freely in this manure, and when it has done so, is severed from the parent plant and trained on the palm stem. Two or three vines are layered to one palm. The best months for propagating by layering or otherwise are June or July. The young pepper plant grows rapidly. The main vine should branch freely into subordinate vines, so that a number of vines can be trained straight up the palm. They are fully secured to the stem by bands stripped from the sheaths of fallen leaves of the betel palm. The bands are tied about a foot apart, and in well-managed gardens are renewed annually at the top and twice a year at the bottom, but in a young plantation a band must be put on from time to time as the vines grow. The main and subordinate vines grow up the tree to a height of five feet or more per annum. Luxuriant growth and free branching are encouraged by heavy applications of good manure given annually for three years after plantation. Subsequently the pepper participates in the general cultivation given to the betel palms and an application of manure is given for both crops every second year. The manure is heaped over the bared roots of the betel trees and pepper plants in a circle round the stems, and if plentiful a big basketful is given to each betel palm, less being given if manure is scant. The basket is saucer-shaped, about 3 feet in diameter and 15″—18″ deep in the centre. The best manure for pepper, betelnut, and all other crops of the garden is made from green leaves and twigs plucked or pruned in the monsoon and used as litter in the byres where buffaloes and other cattle stand, and thence removed to a deep manure pit every day or second day with the dung and urine of the cattle. This manure is sufficiently decayed by the following March, and is applied in that month or in April. The pepper plants in an established plantation rise to a height of 15 to 20 feet. Throughout their whole length they send out horizontal branches which are generally about 18″ long. The foliage in healthy plants is from the ground upwards fairly dense, but in an established plantation some of the older vines die. Then the foliage becomes less dense unless the plants are renewed by new layers. A plantation is in bearing three or four years after it is started, and if the old vines as they get worn out are at once replaced by new layers, the plantation should keep in vigorous growth and bearing for a long period. The flowers appear in July and August and the berries are ripe in March. The yield depends upon liberality in manuring and careful management, also upon the rainfall. The rainfalls of June and July are important as these cause the plants to produce many flowers, but if the rains come in heavy downpours subsequently the inflorescence may be destroyed before it fairly sets. If there is a long break after the first rains the flowers may wither. With light showers, however, a full crop may be expected.

Its Yield.—The vines on one palm when in full bearing yield in a good season about 1,000 clusters on an average. The clusters vary in size; but 1,000 should yield about 7 seers of dried pepper (a seer* = 24 tolas).

The plants, the flowers, and the fruit are delicate in the sense that they are damaged by rough handling. Therefore ladders are used when the vines are bound to the palms and the berries plucked. The ladders are straight single bamboos, with the alternate side branches cut off about a foot from the stem. These provide the steps of the ladder. A wooden hook is rigidly attached at the top end of the ladder and

* 1 Bombay seer = ·7 lb.

secures it to the palm above the level of the tallest pepper plants. The ladder is slightly inclined in a certain direction when in proper position and then can be safely used as it cannot well slip.

HOW PLUCKED.—The bunches are plucked by hand and placed in an oblong cane basket slung horizontally behind the workman by a rope round his waist. The rounded ends of the basket project a little on either side so that the basket can be conveniently filled by either hand of the workman. When plucked all the berries in a bunch may be equally and fully ripe, but ordinarily the bunches are plucked when the berries are mostly green and just changing in colour. The berries may or may not be sorted as they are plucked. If they are sorted those fully ripe are separated. These are soaked in water for seven or eight days or heaped, so that the pulp ferments and then rubbed by hand or on a coarse cloth if the quantity is small or trampled under the feet of coolies if large. The pulp is thus rubbed off the inner "stone." The stone furnishes the white pepper of commerce. The pulp is completely removed by washing in baskets in running water. The pepper is then dried by exposure to the sun for about a week. This has also a bleaching effect, and the pepper becomes pale-grey or pale-drab in colour. It can be bleached a whiter colour by chemical agency. This white pepper is only prepared to a limited extent in the Kanara forests. The chief product is black pepper. It is got from unsorted berries which are heaped up for four days. The green berries then get softer and change colour, and the pulp of all is more or less squashed. Then the berries are spread out and dried. The skin and part of the pulp adhere as a dry, dark-coloured wrinkled covering to stones and the pepper is black in appearance. White pepper is worth R10 to 11 per maund. Black pepper is worth R7 to 8 per maund.

Manures used in Kanara Spice Gardens.

The owners of spice gardens in Kanara depend chiefly upon leaf-mould for manure. They have never used manure of any other description and have no faith that ordinary cow-dung manure, oilcakes, or other concentrated manures would serve thier purpose equally well. They consider that the best leaf-mould manure is got from the green leaves and small succulent branches of certain trees which during the monsoon are used as litter under the feet of cattle tied during night and the greater portion of the day in sheds. This litter is freely used—five large head-loads being brought daily for above twelve cattle. The litter having absorbed the urine and dung is removed daily or every second day and put in square pits which are generally about 8 feet deep. These pits are dug in situations where they catch the whole direct rainfall, which is very heavy, and possibly also a good deal of drainage water from higher levels. The subsoil is very retentive, and there is probably not much drainage through the subsoil from the manure pits, but the contents of these pits must be continuously wet during the monsoon. For each acre of garden an owner would like to have four cattle. He owns always a milch buffalo or buffalocs, but keeps no work cattle as all the garden babour is manual. If he does not own sufficient cattle, he hires them, feeding them gratis for the value of the manure produced. The hiring of cattle is a common practice. They are chiefly fed on dry grass which is of very inferior description. They probably also eat part of the litter as some of the leaves used are liked by cattle. Milch buffaloes get safflower cake or cotton seed, both imported from Hubli Dhârwâri District), and it is rather significant that the gardeners think leaf-mould got from buffalo litter is best for manure. Some owners feed cotton seed or cake to all their cattle in the monsoon, and I have no doubt they find it pays to do so, because ordinarily the cattle are, during this season, miserably thin and unhealthy. Many cattle are brought in from Dharwar, but only survive a few seasons in the feverish climate of Kanara.

In the fair season the cattle get a good deal more freedom, still they are kept in the sheds for probably about fifteen hours in the twenty-four and the sheds are littered freely. The rough grass is supposed to be given as fodder, but is spread all over the floor in the sheds and the cattle eat only a small proportion of it. Again, at this season dry leaves are collected and also used as bedding. But the gardeners think dry fallen leaves poor stuff and discount the value of such as manure. The manure put in the pits in the hot weather has a full year to decay, the manure being used always in February and March. That which is made during the monsoon has less time to decay, and the gardeners attach particular value to the green leaves and twigs of certain trees collected during the monsoon because such decay very quickly. Such leaves are generally large and fleshy and are much more easily collected than smaller ones. A man can collect and carry to the cattle shed five head-loads per day. The leaves and braoches of other trees are also held in high esteem for leaf-mould, because the manure produced has tho reputation of destroying insects and grubs which would be harm-ful to the plants in the garden. The trees which provide leaves of the latter class have all unquestionably astringent properties, and it is perhaps reasonable to believe that vegetable matter containing astringent resins or volatile oils might destroy insect life or that insects would not be likely to harbour in such material. The gardeners assert that since they have been denied the use of the leaves of certain reserved trees grubs and borers have become destructive to their cardamom plants and betel palms, these insects causing damage first at the roots.

It is impossible for me to say what weight of manure is actually applied per acre. But judged by the eye, I think it is certain that the application is at least equal to a heavy dressing for ordinary garden crops. It probably approximates thirty ordinary cart-loads per acre per annum, perhaps more.

The invariable practice is to put the leaf-mould immediately over the roots round the stems. The circle would be 3 or 3½ feet in diameter. It is urged that the leaf-mould, if unprotected, would be washed away by heavy rainfall, and this is perhaps true, and in consequence a good deal of branchwood cut green in the hot weather, so that the leaves adhere, is used to cover the leaf-mould. The branchwood which is most desirable is such as will slowly decay and has astringent properties, *i.e.*, has the power of keeping destructive insects away. The branches of *Fambe* (Xylia dolabriformis) and *Nelli* (Phyllanthus Emblica) have the two qualities referred to in a special degree. The branchwood used does not readily decay. It affords considerabl protection to the leaf-mould. A year after it is applied the leaves have decayed and the branches are partly rotten, still they would break the force of heavy rain. It might be urged that a covering of soil over the leaf-mould would be sufficient protection, especially as the soil of these gardens is of a decidedly adhesive character. It is possible that this adhesiveness would tend to exclude air and moisture from the leaf-mould and prevent it serving its purpose as manure. But I do not believe such would be the case. At Bassein in the Thana district, with a rainfall as heavy as that in Kanara, the manure given is put round the roots of the plantains, betel-vines, and other crops much in the same way as at Kanara and protected by a covering of soil. The soil is, however, a light alluvial sand and the manure is not washed away. The manure used at Thana is cow-dung manure and castor-cake, chiefly the latter, and it is given in several applications every year. The question is, can a manure of this class be economically substituted for a portion at least of the very heavy and very expensive dressings of leaf-mould now applied. I consider that the leaf-mould manure is expensive, even although its production requires only labour in collection and the keeping and feeding of cattle.

Castor-cake and safflower cakes are produced on a large scale in the Dharwar district and are obtainable at very moderate rates by the Kanara gardeners. It might, therefore, be advisable to experiment with these manures and prove their effect.—*Agricultural Ledger.*

THE TAPPING OF RUBBER TREES IN THE CHARDUAR RUBBER PLANTATION, ASSAM, 1899.

In the Assam Secretariat letter No. 9 Forests—388R. of 23rd January 1899, the Chief Commissioner's sanction was given to the experimental tapping of the rubber trees in compartments Nos. 1 to 4 of the Charduar plantations. The following report shows the results of the operations:—

2 *Results of Operations.*—The accompanying statement gives these results:—the areas of the operations, the numbers of trees tapped, the yield in rubber, the average yield per tree and per acre, and the cost of the operation. The areas include the above four compartments, and also the 8 acres of the Bamoni Hill plantation in Tezpur, the results for each being shown separately.

3. In the statement attached, a distinction is made between—

(*a*) Trees tapped, which had been previously untapped, or only moderately tapped.

(*b*) Trees previously heavily tapped, or suppressed trees.

The results were, from the four campartments:—
for (*a*) trees ·90 lb. per tree;
for (*b*) „ ·23 „ „ „

The total yield of the four compartments was 2,947 lb. of rubber. As will be seen from the following remarks, the low outturn is probably partly due to rain, which, during the operations, washed away a considerable proportion of the rubber before it was dry. The rubber was sent to London and sold, the results appear below.

4. *Description of Operations.*—Mr. D. P. Copeland, Deputy Conservator of Forests, Darrang Division, in his report on the operations which he conducted, refers to the close supervision required to prevent theft, and describes in detail the operations of tapping, collecting, drying, etc.

In accordance with instructions, the girth of the bole and the measurements of the crown were recorded in the cases of 10 per cent. of the trees tapped, and these trees were labelled.

The work of tapping and collecting the rubber, which commenced on 24th January, and continued till 31st March, was at first tried with Mikir and a few Garo coolies on the daily wages usual in the locality—8 annas a day. Owing to the unsettled weather, it was found that this system was too costly, the rain necessitated stoppage of operations from time to time, and work elsewhere had to be found for the tappers; again, the coolies had no interest in the outturn. After the tapping operations had been completed in compartments Nos. 1 and 2, the work in compartments Nos. 3 and 4 was therefore given out on contract, under close supervision to prevent theft, to a Nepalese contractor at R30 a maund, and to local Assamese, not so good at the work, at R20 a maund, the cleaning being arranged for separately at one anna a seer. The results in the yield per tree and cost of tapping and collecting were therefore better in the cases of compartments Nos. 3 and 4. It appears that the Nepalese are the best men for this work.

Position of cuts.—In compartments Nos. 1 and 2, treated by Mikir labour, the system adopted was to make the cuts regularly one foot apart down the stem of the tree, these cuts being horizontal, and not exceeding 8 inches in length and 2 inches width. Aerial roots and branches, less than a foot in girth, were not tapped. It was afterwards found that no fixed rule could be laid down, and that the experienced Nepalese tappers make the cuts 2 feet, and often further, apart, and the length of the cuts varies with the girth of the bole. Again, they avoid making the cuts immediately one below the other, and locate them alternately, as below:—

The position of the cuts appears to have more effect on the yield than their number.

Collecting.—In compartments Nos. 3 and 4 the contractor included the tapping, and the work of pulling the rubber off the tree after coagulation. The rubber takes four or five days to "set" on the surface of the tree before it can be collected. This work of collecting took as long as the tapping.

Weather.—One of the essentials for success is said by Mr. Copeland, to be settled weather. If rain occurs within two days of tapping, the milk is washed away, and the loss is heavy, while which remains on the stems loses part of its elasticity, becomes brittle and discoloured. The operations were greatly hindered by the frequent rain, both in outturn of rubber and in cost of labour, since work had to be stopped and employment found elsewhere for the labour.

Tarring.—As soon as the rubber was pulled off the trees, the cuts were coal-tarred, 17 barrels of tar being used for the 322 acres.

Cleaning.—Unless the rubber was cleaned immediately after collection, pieces of bark and chips of wood and other impurities imbedded in it were difficult of removal. The work of picking out these foreign matters was done by contractor at one anna a seer, the loss in weight on the first weightments being about 8 per cent.

Drying.—After this cleaning, the rubber was spread to dry—at first in the sun—but as this seemed to make some of the rubber brittle and discoloured, and made some to melt, the system of drying in the shade was adopted. The loss from dryage is reported to be about 1 per cent. only.

Yield.—Weighment of the rubber was made for each compartment separately on the spot, as soon as it was pulled off the trees. A reference to the statement will show that for compartments Nos. 1 and 2, the yield from the trees of the (*a*) class was 0·79 lb. per tree. For compartments Nos. 3 and 4, however, the trees of which were tapped by skilled labour, the yield was 0·97 lb. per tree, or 22·8 per cent. more than for compartments Nos. 1 and 2. Mr. Copeland thinks the difference would have been still more marked, had it not been for the rain, which did more damage to rubber in course of collection in the last two compartments than in compartments Nos. 1 and 2. The yield per tree is given in the statement, as also the yield per acre.

Cost of Operation.—The statement gives the cost of the operations of tapping the trees and collecting and cleaning the rubber, which comes to seven annas two pies per pound of rubber. At the foot of the statements, however, are given the details of other expenditure incurred on the operations, the whole being about three times the above sum per pound of rubber. To this it is necessary to add the cost of freight to London, insurance and agents' expenses, as is done below. Mr. Home was present during part of the operations.

5. In future operations, the work should be done earlier in the season, so as to avoid the rains of February to March.

6. The question of re-tapping the same trees next season and annually, as originally proposed, is under consideration.—*Indian Forester.* E. G. CHESTER.

RUSTY NAIL WOUNDS.

Treading on an upturned rusty nail sticking out of an old board is a very common accident. Children who are in the habit or running about barefooted are especially liable to such an accident, and fatal consequences often ensue, lockjaw and subsequent death being often the reult. "Pansy" contributes to the *Australian Farm and Home* the following very simple remedy in such cases, which is at all events well worth a trial:—The remedy is simple, always on hand, and can be applied by anyone; and what is better, it is infalliable. It is simply to smoke the wound, or any bruise or wound that is inflamed, with burning wool or woollen cloth. Twenty minutes in the smoke will take the pain out of the worst case of inflammation arising from the wound. People may sneer at this remedy as much as they please, but when they are afflicted just let them try it.—*Queensland Agricultural Journal.*

THE TEA AND PRODUCE COMMITTEE.

REPORT FOR THE YEAR 1899-1900.

The Committee has held four meetings during the year.

The chief business of the year has been the work carried on by the India and Ceylon Joint Committee in respect of the attempt to abolish the 1-lb. draft allowance per package of Tea, and the subsequent prolonged negotiations with the Tea Buyers as to the agreement arrived at in August last for a new system of weighment of Tea by the Customs. It is unnecessary here to go into the details of the various incidents in the dispute, which were set forth at length in the exhaustive minute issued by the Joint Committee on 12th December last. The ~~issue in~~ Nov mber last by the Board of Customs of Port Order 39-1899 seemed for a few days to have brought the matter to a settlement, but the subsequent suspension of that order before the date when it was to come into force quickly reopened the controversy. The Tea Buyers then suggested as an alternative settlement the acceptance of Port Order 39-1899 in consideration of certain alteration in the Sales Conditions being agreed to, and proposed a Conference of Buyers and Importers to consider these alterations. Your Committee on 11th December last nominated Mr. Alfred Brown to represent Ceylon interests at the Conference, and for the intervening five months that gentleman has been constantly engaged in the negotiations. The thanks of the Committee are due to him for his labours.

No agreement has yet been come to in regard to the propoaed alterations, but in view of the recent reduction in the Bulking and Taring rate for Tea at the London Warehouses and the consequent withdrawal of objeetion to the separate taring of London bulked Teas, your Committee recommended a settlement of the long pending dispute on the terms of the original agreement of 2nd August last. This has now been brought into effect by the issue by the Board of Customs of PortOrder 42-1909, which comes into operation on 1st June.

The Committee is glad to be able to report that some measure of success has attended the efforts, made in conjunction with the Indian Tea Association, to obtain a reduction in the London Warehouse charges on Tea. The reduced scale of rates for Bulking and Taring mentioned above came into force on 1st March, and it is now announced that the Tea Clearing House has decided to increase the discount allowed on other charges from 10 per cent to 15 per cent. The Committee does not consider this last concession to be adequate, and will not relax its efforts until a further reduction is obtained.

Matters of minor importance that have engaged the attention of the Committee are the import from Ceylon into this country of spurious Cinnamon, Mr Hughes' report on selected samples of prepared Cocoa, and the equalization of tares in the case of Tea by the insertion into the packages of loose pieces of lead or wood.

At the request of the Committee of the Planters' Association of Ceylon, representation has been made to the London Fire Offices Committee for a reduction of the rates of premium for Fire Insurance in Ceylon.

The duty on Tea imported into this country was raised in March from 4d to 6d per pound.

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UDAGAMA TEA AND TIMBER CO.

REPORT.

The report now before the shareholders embrace a period of 15 months from 30th September, 1898, to 31st December, 1899.

During the early portion of the period under review the weather was very unfavorable for tea and later on some crop was lost through want of labour (Singhalese). Only 142,879 lb. of tea were obtained from all the estates; nevertheless the loss of the previous year (R8,162·09) was turned into a small profit of R2,070·81.

Prices obtained were encouragiug 32·45 cents per lb. being the average for the 15 months. The cost however was heavy—31 cents. Plucking and weeding were both very expensive.

A crop of 170,000 lb. has been estimated for 1900, it is hoped that it will not cost 25 cents per lb. The new clearings present a splendid appearance and will give a very large yield in 1901. The effect of manure also on the older estates is now shewing itself, Ginnidomine is looking very well and will give a very good crop.

Homadola has never been of much value to the Company being widely apart from the rest of the estates and situated eight to nine miles from the Factory, your Directors have therefore accepted an offer for its lease for five years for the sum of R1,100 per annum.

A block of 754 acres of forest on Homadola was sold early in 1899 for R25 per acre, the proceeds were applied to the cost of the new factory under arrangements with the debenture holders.

Sawmills.—The profit made during 15 months amounted to R1,759·68; the work was very much impeded by the great difficulty in obtaining labour owing to the rush for plumbago. Transport of timber from the forests was very expensive and mill hands scarce and dear.

Only 49,685 chests were made during the 15 months against 58,210 during the previous 12 months. The price of tea chests have now risen very considerably there is a prospect of a much better result during the ensuing year.

In addition to the loss in interest shewn in the accounts a sum of R8,199·50 is due to the preference shareholders for interest. This is not payable until sufficient profit has been made to meet it.

It is the duty of the shareholders to appoint an Auditor for the year 1900, and a Director in the place of Mr. R D Kershaw who retires by rotation and eligible for re-election.

Tea Consumption among Natives.—The Manager of Messrs. Lipton Ld. writes to the *Indian Planters' Gazette* as follows:—"I notice a paragraph in your issue of 23rd instant written on somewhat the same lines as your leading article of 2nd June, in which you appear to take it for granted that nothing is being done to approach the European population in India regarding the consumption of Indian tea. I would point out that there is one firm in India which has done, and is still doing, more towards bringing Indian teas to the notice of the inhabitants (both European and natives) of this country, than is done probably by anyone else. In nearly every bazaar in India, you will find that (thanks to the labours of Lipton Ld.) Indian tea is being sold, and is thereby being brought to the notice of an increasing number every day, and it is, therefore, hardly correct to say that there is no organized effort to push Indian teas among the inhabitants of India."—We wonder if the same policy is being pursued by Messrs. Lipton, Ld, in Ceylon, or if natives are left to find out the advantages of tea-drinking by themselves.

TRINIDAD BOTANICAL DEPARTMENT:

(EXTRACTS FROM THE ANNUAL REPORT OF THE SUPERINTENDENT ROYAL BOTANIC GARDENS, (J. L. HART, ESQ., F.L.S.,) FOR 1899.)

Establishment.—Mr. Millen acted as Assistant Superintendent from November to March when he was succeeded by Mr. W Leslie from Royal Gardens, Kew. Mr. Millen took up the duties as Curator of the new Botanic Station which was started in Tobago, in March.

The staff is now as follows:—

1 Superintendent, J H Hart, F.L.S.; 2 Curator, Tobago, H Millen; 3 Assistant Superintendent, W Leslie; 4 Clerk, H C Massy; 5 Gardner, Government House, J Bailey; 6 Cacao Instructor, Tobago, W E Caines; and 7 Herbarium Assistant, Pauline McLean.

Meteorology.—The rainfall of the year was very small, and the driest since 1885, only 46·76 inches having fallen. In 1885 only 43·22 inches fell.

Herbarium.—Over 200 sheets of specimens have recently been returned from Kew where they had been sent for determination. Among the plants new to Trinidad, are several Mainland species, as was to be expected. Last year I recorded the determination of a new species of Lucuma, and I have collected seed specimens during the year which show that there is yet another undescribed species, of this genus to be registered for Trinidad. Growing seeds were secured, and we have numerous young plants at the Experiment Station at St. Clair where the plants can be grown on to maturity. Cacao disease has demanded attention, and a report received from Mr. Massee of Kew shows that in all probability the diseases prevalent in Trinidad are similar, if not identical with those of Ceylon. The disease causing the death of Tangerine oranges has also been studied during the year and found to be due to a micro-fungus which attacks the stem of the plants at the ground line. This was sent for examination to Kew. Mr. Massee's report runs as follows:—

Deceased Orange Tree from Trinidad.—The tree has been killed by a fungus called *Botryodiplodia diplocarpa Ellis & Everht*, which appears on the surface of the stem under the form of black warts that have burst through the bark. The fungus was first observed attacking orange trees at Pointe a la Hach, La, U. S. A. (Signed) George Massee, 8th January, 1900.

This fungus is most destructive to varieties of *Citrus nobilis* (Tangerine, Manderine, &c.) and also the St. Michael's. It is less so to the Seville or bitter orange. It is probable therefore, that by grafting on the latter stock, the effects of the disease may be largely mitigated. In some districts in Trinidad it is almost impossible to get the Tangerine to live but for a short time, and many trees are suddenly killed out, which a few weeks previous were pictures of health. The disease is seldom discovered until it has gone beyond remedy, and I would therefore counsel frequent examination of the stems at the ground line, and when found to be effected they should be dressed with a wash of sulphate of copper and lime, which we have commenced to use apparently with success.

Margravia elegans, Kr. & Urban; M. Hartii, Kr. et Urban; Duguetia lucida, Urban, and *Inoa Hartii, Urban*, are the names of four new species sent on to us from the Berlin Herbarium. *Polypodium tijuccanum*, Radd., was also registered for the first time as a Trinidad plant during the year by our *confrère* of British Guiana, G S Jenman, Esq. In 1895 I reported that the Herbarium Cabinets were full, but as yet no new ones have been added. This work will be more conveniently carried out at St. Clair, and will be commenced I trust during the ensuing year. Our Cabinets are all made of West Indian Cedar *(Cedrela odorata)* from trees cut upon the Establishment, and are made by the regular employés of the department.

Considerable interest has lately been shown in connection with leguminous plants as agents by which nitrogen is made available in the soil for the use of other plants.

Several genera and species have been examined, and the nodules containing the nitrifying bacteria have been examined, the bacteria found, coloured, and mounted for future reference. The "Saman" tree, *Pithecolobium Saman*, has been found to proproduce *nodules* containing abundant bacteria.

A very large number of specimens of the local flora have been brought in during the year, dried and mounted; and our work in the old quarters is now cramped for want of room. His Excellency the Governor has authorized a provision on the estimates of £500, for the erection of a new office and Herbarium at St. Clair, where ample room will be arranged for. The Herbarium will be transferred as soon as the new quarters are ready, and subsequently all office work of the Department will be done at St. Clair. Provision has also been made on the Estimates for a new microscope of modern pattern with apparatus for biological work; and in the new quarters a suitable room will be provided for its use. The microscopic work on the cacao fungus, carried on during 1899 in the Trinidad Herbarium, elicited commendations from the Director Royal Gardens in the Kew Bulletin, when reporting work on the fungus by the Kew Staff.

Reports on the above were published in the Trinidad Bulletin at the time they were received. The main points were, first: That a fungus, *Phytophthora omnivora*, was found to be very destructive to full grown cacao pods; second: A fungus *Nectria Bainii* was also found upon the pods, whether parasitic or not has not been determined: third: Upon the bark of cankered trees another species of *Nectria* was also found which is supposed to be similar to that causing canker in Ceylon. (Signed) —George Massee.

Experiment Station, St. Clair.—All the work on the new establishment was last year recorded under the head "Economic Section." The new station is, however, primarily, an establishment for carrying out the larger portion of the work of the Botanical Department, and embraces Agricultural, Horticultural, Arboricultural and Botanical duties, with various sub-divisions. The station itself is divided into three principal sections. The 1st or eastern section is principally devoted to fruit culture. The 2nd division is being laid for Botanical purposes chiefly, and will contain the new offices of the Department (shortly to be erected) and all cultivations of Botanical interest, or of scientific and decorative value. The third division is laid out in trial plots for the various economic plants, and for the raising and testing of seedling canes. It contains the nurseries, tool houses, experiment and potting sheds, propagating houses, stables and workyards, &c., &c.

The work carried on by the Department when all arrangements are completed will be as follows:—

1. Agricultural and Horticultural experiments and trials including the raising and testing of seedling canes.
2. The propagation and distribution of timber trees, economic and decorative plants (by sale or otherwise.)
3. The cultivation and trial of different classes of native and imported trees and plants of Botanical interest.
4. The study of diseases of plants, occasioned by insects, fungi, &c., &c.
5. The collection from forest and roadside of Botanical specimens, in view of the preparation of a Flora of the island of Trinidad, and for scientific reference.
6. Collecting, importing, and growing the best varieties of tropical fruits, to prove their value for Trinidad.

7. (A.) Training men and boys in Agricultural and Horticultural work. (B.) Training young men after leaving school who intended becoming Planters. (C) Providing lectures for the school teachers of the Educational Department, who are to teach Elementary Agriculture in schools.

8. Distributing information by Bulletins, Reports and Correspondence.

9. The importation and growing of newly discovered plants from various countries.

10. The maintaining of exchanges of plants, seeds and specimens with Botanical establishments—Foreign and Colonial.

11. Conducting Agricultural Examinations of men boys, cadets, school teachers, &c., &c.

12. Keeping and recording Meteorological and Seismographical Observations.

13. Overlooking current Foreign and Colonial Literature and Exchange, for articles on tropical ultures likely to be of use locally.

14. Inspection of Railway Stations annually. Official attendance at Agricultural Society's meetings, and other miscellaneous duties.

Mr. Leslie who was appointed to the department as Assistant Superintendent, has immediate charge of St. Clair, and is practically its "Curator." The work is, however, directed by the Superintendent, who makes long visits for the purpose, and who, when the department office is ready, will of necessity spend the greater part of his time at this establishment. The St Clair Establishment has been proclaimed under the Ordinance No. 33 of 1898 as set apart for the cultivation of vegetable products, and Regulations have been made for the good government thereof.

PEPPER NIGRUM.—Some few years ago an attempt was made to grow and fruit Piper Nigrum which was partially successful, and ripe berries in fair quantity were produced. Many of the vines planted however did not assume the fruiting stage. It was observed that during the vegetation period the leaves of the vines were *cordate* in form, but that when fruiting is about to commence it may be known by the difference in the shape of the leaves, as the plant is then clothed with leaves which are decidedly *lanceolate* in form. As soon as the latter appear the flowers follow.* Grown as we now grow it, the crop sets and ripens readily, and we are able to obtain yearly supplies of well ripened berries, these have been in some demand for seed purposes with European seedsmen, our vines being the most easily available, and probably the only source of supply in this hemisphere. The vines are planted at the foot of trees of *Erythrina corollodendron*, which are planted in rows ten feet apart and six feet in the row. There appears to be no special difficulty in growing regular crops, as we have had them under these conditions for the past four years. Much has been said about male and female forms of vine, but it has been observed here that when planted in a proper place and under suitable conditions, all the forms of *Piper Nigrum* will seed freely. There is a form, however, which if propagated will fruit when in a diminutive state and does not climb, which produces berries at one foot from the ground. We have one-tenth of an acre of *Piper Nigrum* at St. Clair growing extremely well.

RUBBER—(*Hevea brasiliensis*) "*Para Rubber.*"—This tree grows well with us but the yield of *latex* appears from a single experiment to be insufficient to warrant its being largely planted except on swampy or riverside lands subject to floods. Our largest tree has a girth at 3 feet above ground of 58 inches, and is 40 feet in height. Young trees at St. Clair planted in ordinary soil in July 1898, are now 14 feet in height, and in diameter at the ground line 1·6 inches. Our largest tree bore a shot crop of seed this year, but sufficient plants have been raised to satisfy the demand. Trees of *Hevea confusa* are bearing seeds, but these have not been largely sown as the rubber produce by this tree, so far, is found to be of inferior character.

* See figures I. and II.

We recently sent seed safely by post from Trinidad to British Honduras. From seeds of the Orinoco rubber sent us by Dr. Bovallius only four plants were raised. These have been planted out and are growing slowly on our south-western boundry, St Clair. *Kicksia Africana* or "*Iré Rubber.*"*—Our block of this, is one-fifth of an acre in extent, the oldest trees of which are over 8 feet in height. They commenced flowering early in 1899, and towards the end of the year several have seed well advanced to maturity. In my last Annual Report, I called attention to the fact that a species of *Kicksia* was said not to produce rubber. That our plant produces good rubber is not left to doubt, as rubber of excellent quality has been made from it. A specimen of the fruit has been sent to England by request of the Kew Authorities to determine points of nomenclature which had arisen. The tree appears to thrive in our climate, and if it will produce sufficient rubber must become valuable. We shall be able at an early date to test the trees. So far there appears to be abundance of *latex* even in the driest weather; although the tree can stand a large amount of sun, it appears to grow quicker in the young stage when it is fairly shaded.

Central American Rubber.—(Castilloa Elastica).—This plant thrives well in Trinidad and has proved itself very hardy under trying conditions. We have reports which show that although the weather has been extremely dry, many lots of plants have stood the hardship extremely well. Several thousands of plants have been sold and also large quantities of seed. Our largest tree planted by Mr. Prestoe many years ago is over 60 feet in height and yields large crops of seed yearly. A tree planted in 1888 is over 40 feet in height and 51 inches in girth at 3 feet from the ground. It yields abundant latex. The plantation of this rubber made at St. Clair in July 1898 has grown well, some of the plants are 11 feet high and over 2·86 inches in girth at the ground line. Later on, it is intended to test these trees for *latex*, and they are planted thickly for the purpose.

A simple machine has been brought out by Messrs. Christy & Co. of 25, Lime Street, London, for preparing the latex from Castilloa. It is called the "Beta" Separator and is an improved creaming or washing process. Rubber made with one of these machines has been shown and pronounced very fine in Mincing Lane, London. The machine is simple in the extreme, and its working easily understood from the concise direction issued. It can be worked by a man and a boy, and will coagulate 50 to 100 lb of rubber per day. The machine is small and sufficiently handy to be carried to the trees, but a stream or well of clean water is required for washing the *latex*. Castilloa promises the best of any of the rubbers, so far local cultivation.

THE DATE PALM, (*Phœnix dactylifera*,)—For many years seedlings of this plant have produced fruit and seed very freely, the size of the fruit varying on different plants. Learning that the best kinds of dates were borne by trees raised from "suckers," an application was made to the Government to allow of an importation being secured of the best marketable kind. It was ascertained that these could be obtained from Algeria, and a vote was sanctioned in 1899 Estimates for this purpose, a part of which was expended in preliminary expenses. It is intended to plant these trees in a small grove at St. Clair. The Date Palm has always been associated with the arid Desert, and formerly everyone was content to grow them in the driest and poorest possible position. It now appears that the best Dates are grown in rich valleys. By following this initiative, it is hoped that we may succeed in producing good yearly crops. Our trees are expected to arrive during 1900. The fruit of our seedling trees like all other seedlings, is variable in quality, but in some instances sweet and wholesome, though too small to be of value.

Coffee.—*Coffea Stenophylla.*—The plantation of *Coffea Stenophylla* in common with everything else has suffered from drought, but in the best shaded por-

* Now Funtumia elastica.

tions, the trees are doing well. Our largest trees at the old garden have again borne well and the coffee produced has been shewn to be excellent in quality, the bean resembling that of the Mocha variety of Central Arabia. Among the seedlings raised are plants so distinct from the type that there can be little doubt that they are either natural hybrids, or widely ranging seminal varieties. These plants have flowered and the flower is larger than that of the type and somewhat different in form. When the fruit appears there will be further indication of origin, as the purple colour of the berry of the type is a well marked feature. In the second year's showing, there has also appeared one or two of the same type. The leaves are larger, darker in colour, and the plant grows and stands drought and sun far better than the type.

ABBEOKUTA COFFEE.—Trees of this coffee have fruited for the first time, and their appearance indicates that this kind is merely a form of *Coffee Liberica*. It has, however, a somewhat different habit of growth, and appears to be even hardier than that kind, and stands the sun better. The berries are much smaller than Liberian and have much less mucilage surrounding the parchment covering, yet the beans are of fair size. It is a kind which deserves extensive trial.

MINERVA COFFEE.—This coffee has again produced a good crop, and I consider is one to be highly recommended for general culture. This year's crop has been largely sold to French buyers for their Colonial possessions but sufficient is on hand to supply the local demand.

GOLDEN DROP COFFEE.—This is an Indian variety planted at St. Clair, as reported last year. It is now flowering, and a crop of fruit will, I trust, be ripened in due course. It is extremely healthy and is growing rapidly and well.

ORANGES (*Citrus aurantium.*)—The orange trees in the avenue planted last year have grown well and produced fruit, but have been attacked by fungus at the base of the stem. Some little attention has been paid to grafting and budding oranges and a few of the best varieties have been secured, but for want of proper appliances (which it is hoped to provide this year) no large numbers could be worked off. It is found that neither grafts nor buds can be depended upon to grow if left in the open; and close cases to maintain a certain and regular humidity, must be put in use, before any quantity can be established in this manner. In a large grove of some 2 acres of seedling oranges planted by my predecessors there is ample evidence of the variation which occurs when the sweet orange is raised from seed; for all though the oranges have a family likeness, still, the flavour and character of the pulp is found to vary in a very wide degree, for on no two trees is fruit to be found the same in appearance and quality. The following testimony in favour of Trinidad oranges has been received from His Grace the Duke of Rutland, to whom a small parcel was sent from trees growing in the Garden attached to the Superintendent's quarters:—"I thank you heartily for the basket of Trinidad oranges. They were served at desert yesterday and voted excellent. They were ripe, with thin skins AND OF FINE FLAVOUR. Such oranges ought to command a ready market in England, and I hope the efforts you speak of will have the effect of opening a good market for them here. (Signed) RUTLAND."

BERGAMOT ORANGE.—A section of land one-tenth of an acre is planted with seedling Bergamot oranges. The plants were raised from seeds received from the district in Italy whence comes the famous Bergamot oil. The variation in the leaves of these plants is clearly marked. Many so called "Bergamots" exist in the West Indies, but it is doubtful if any of the best oil producing kinds exist. The variation is perhaps more marked than with any other species of the *Genus, Citrus*; but it is hoped that some of our seedlings will prove to be the true oil producing variety. To make sure, however, that we have the right kind, we shall endeavour to import grafted plants direct from the districts known to produce the best oils.

TANGERINE ORANGE *(Citrus nobilis)*.—A grove of the above, planted in 1892, has fruited for the first time this year, and the flavour and size of the fruit is quite as variable as with the ordinary sweet orange. It must therefore be concluded that no reliance can be placed upon any variety of the Genus, Citrus, coming entirely true from seed. Two trees of the variety of *Citrus nobilis* mentioned in former reports, as the "Grenadine" orange fruited together during 1899. These two trees were raised from seeds taken from a single Grenada fruit in 1883. The one tree produced fruit four to five inches, while the other gave oranges only two to three inches in diameter, and the quality and size were equally at variance.

FODDER PLANT (*Pennisetum triflorum*).—This is a grass originally introduced and grown in Jamaica at the Government Cinchona plantation, while the writer was in charge. It was sent from thence to the St. Lucia Station, and thence on to Trinidad. An accurate area of one-fortieth of an acre was planted and cuttings were made as follows:—

July,	1899	...	407 lb.
August,	,,	..	445 ,,
October,	,,	...	279 ,,
December,	,,	...	246 ,,
			1,378 lb.

This gives a value of nearly twenty-five tons to the acre per annum of the green product. The experiment will be continued to determine its value in comparison with other grasses. It is certain, however, that the unedible portion is quite small when compared with the popular Guinea grass, but this must be shown exactly as also must the loss in drying to enable its true value to be ascertained. We hope to get a full analysis during the coming year in connection with these details.

FRUIT TREES.—A number of the best varieties of MANGOES have been planted, and the following kinds are growing freely:—Gordon, Peach, Malda, Peters, *Amelie*, *Divine Julie*, *Chinoise*, or Chinese, Father Louis, De Boissiere, No. 11, *D'Or*, Mistake, Nina, Apricot, Maraval, *Dudouce*. A large area of seedlings have planted to prove the amount of variation from seed. Our best kinds of mangoes have been largely propagated by grafting, and the demand is steadily increasing. Grafted plants of the best French kinds were introduced from Martinique, and His Excellency the Governor has sanctioned the importation of sets of the best East Indian kinds from Bengal, Madras and Bombay, which it is hoped will add to our list of first-class kinds. It is to be noted that trees of the old East Indian kinds were introduced under the names of "Malda," "Peach" and "Peters." Looking up the nomenclature in Watt's "Economic Products of India," it appears that in "Malda" we have the name of a race or class of Mango, and it cannot be doubted by those who know them that the three fruits mentioned are simply varieties of the one class, and indeed little worthy of distinctive names. Dr. Watts after stating that he is indebted to Mr. Maries of Darbhangah for the information states: "The cultivated Mangoes of India have arrived at a great stage of perfection and consist of very numerous races, although these are unknown to most people, except as Bombay's, Lungrah's, and Malda's. The many dozens of sorts sold in the Bazaars under these three names have given the idea that there are only three Mangos fit to eat. These three names really represent three distinct strains of cultivated fruits. It is interesting to note the changes that have taken place in these fruits. The form and shape has continued almost the same as the wild varieties, but the flavour has developed from "*tow and turpentine*" to something too exquisite to express in words, each variety having a flavour of its own." From a following paragraph it is apparent that the East Indian kinds have been secured by practising

selection from seedling kinds, for Dr. Watts says: "The sweet ones were allowed to grow while the sour and worthless were cut down and used as fire-wood." Mr. Maries reports further of the cultivated sorts of Mangos, he says: "I have collected upwards of 500, and from these have selected 100 good ones; and these have been grown on model plantations." A numerous list of varieties with Indian names is given, among which appears the "Peters" and "Malda." The "Afooz" is the so called Bombay Mango, of this it is said: "It is really not a Bombay fruit at all.' The Bombay Mango of the upcountry gardens is said to be "Durbhangah Bombay." Of the Gopalbogh it is said "A Malda sort." This is the celebrated Malda kind said to be equal to the "Afooz." The "Afooz" is classed with the "Malda" and all are of the so called Bombay type. It is to this class that the Mangos belong—called in the Trinidad garden "Peters," "Peach" and "Malda." The "Gonraya Malda" is spoken of as one of the finest Mangos of India. A second class of Mangos is called Kerbuzza Mangos, called Kerbuzzas or Melons from the musk scent they possess. Of these it is stated there are three good kinds. The third class of Mangos are called Badayas or true Malda's and of these several varieties are mentioned. Two other classes are noted but the produce is of no importance.

It will thus be seen that the nomenclature of mangos is somewhat indefinite, even in India, and considering the numerous seminal varieties which have sprung up since the introduction of the tree to the West Indies, it is not to be wondered at that differences of name should arise in the Western tropics. Our work in Bulletin giving figures of the varieties will help to correct the nomenclature in no little degree, as has already been seen.

FIBRES.—A section was devoted to the growth of of the native Abutilon *Aperiplocifolium*. The produce was sent to England and reported on as being worth £16 per ton. The facility with which this fibre can be prepared by hand, points it out as a suitable article for cultivation where cheap labour can be had.

The yield was as follows:—1—Per acre. Raw material 1·08 tons; 2—Percentage of dry fibre obtainable from raw material 42·6 per cent; 3—Yield per acre, dry fibre 9·25cwt; 4—Value per acre £7 8 0.

SISAL HEMP.—The plant producing Sisal Hemp (*Agave rigida var. sisalana*) grows very fast in Trinidad and produces fibre of the finest quality. I do not consider however that it is likely to be largely planted, while Cacao and Sugarcane can hold their own. A nursery reserve is always maintained and plants can be had at all times.

YAMS. (*Dioscorea of sps.*)—The cultivation of yam has been continued, and the 1899 trial gave following return:—

Variety.		Average yield	per plant.
Red yam	11 plants gave	7	lb. per plant
Seedling	11 ,,	9·27	,,
White yam	50 ,,	17·58	,,
St. Lucia	16 ,,	25·18	,,
Cush-cush	66 ,,	6·07	,,
Negro yam	19 ,,	17·57	,,
Yellow yam	5 ,,	10·00	,,
Chinese yam	10 ,,	19·80	,,

The "St. Lucia" yam is a large and coarse white kind of very good flavour. The "Negro yam" is the best white yam of the set, and the "Yellow yam" is the best of the other kinds. The Red yam is a variety of the ordinary white, and is of good flavour.

SUGAR.—Mr. John Turner, Attorney for the Straits Sugar Planting Co. Ltd., has recently been prospecting Batu Pahat in Johore, with a view to obtaining a concession of 500 acres of land there, for the purpose of sugar planting. The Company is making giant strides, in the direction of extending its sphere of labour and business.—*Perak Pioneer*, June 20th.

A FARMER'S EVERYDAY LIFE.

(*By Cosmopolite.*)

No. VIII.

The latter part of the month of May is devoted, almost entirely, by farmers to getting the ground ready for

THE TURNIP CROP,

and in sowing the seed, what with ploughing and grubbing the ground, collecting the growth, setting up the drills, and then manuring, covering and sowing the seed, this may be considered the most important and most laborious work in connection with the cropping of the land. According to the rules of good husbandry the allowance of manure to the acre is estimated at 12 loads of cattle and 5 cwts. of artificial, but as I have already stated, not being a believer in the latter class of manure, I, in preference, put 25 loads of cattle or other bulky manure to the acre, and find that although entailing a much greater amount of carting and labour in general, the result is always a very much better crop. The idea of using artificial manure at all is in order to bring the plants rapidly up to the hoe, and for this purpose quick-acting fertilizers, such as superphosphate, nitrate of soda or potash are used, but as a matter of fact if the land is in good heart, no such assistance is required, and I find my turnip plants ready for hoeing, without any help from artificials, quite as soon as those of my neighbours; and not having been forced at all, they run less risk of *setting* and are in no danger from canker or finger and toe disease. When I first came to this farm the turnip break was so diseased that about 20 loads of roots to the acre was all the crop I got, but 40 to 45 loads is now my average, and disease is unknown. I may say, therefore, without undue boasting, that my system has proved both satisfactory and profitable. It is not my desire in these articles to lay down the law to any one who intends to adopt farming as a pursuit; I merely wish to give instances in my own experience which appear to me to have worked out more successfully than would have been the case, had I followed the rule of thumb-style of procedure, so common amongst agriculturists. Who am I that I should dogmatize on a subject that has been before the public ever since Adam delved in the garden of Eden, and for the first time set his early ash-leaf kidney potatoes, or whatever his specially favorite vegetable was. If I wished to give a reason to my readers as to why they should believe in the system of farming which I have adopted in opposition to the customs of followers in the old beaten track, I might hint at my own age and the many years I have devoted to farming, but I know that that would be considered but a feeble reason and I might bring upon myself the accusation of being my own brass band, for in this age of free education and enlightenment, we do not hold the aged in respect because of the experience they have gained, but because it is mostly the old men that have all the money. But to return to my muttons—and for want of a better, le

MUTTON

be the theme of my following remarks.

Last autumn the price of breeding ewes, for some reason or another, went up very considerably, and at the same time a drop of several shillings per head took place in the price of feeding sheep. In this district every one began plunging on the former class, while the latter kind were practically unsaleable and as is my usual custom I at once proceeded to do what my neighbours were *not* doing and rushed all my breeding ewes into the market, where I got extravagant prices for them, filling their places at home by the purchase of feeders. I had remarked that owing to drought in Australia the statistics of that country showed a reduction in the number of sheep there of 20 millions, which in my opinion meant a shortage in the supply of frozen mutton to this country. The war in South Africa, which had just broken out, I knew would be the means of diverting transport vessels from their regular beat between this and America, and so the supply of cattle and sheep from the West would undoubtedly be curtailed. Putting therefore two and two together I felt convinced that fat sheep would be booming in the near future, so I plunged to a certain extent, and bought a few hundred more than I usually do at that season. Things turned out exactly as I had hoped they would, and mutton has been throughout the past six months higher in price than for 18 years and the sheep which I bought in autumn, I have resold at from two to three times the price I paid for them. Nothing surprises me more than the indifference paid by my brother farmers to

THE PRICES QUOTED IN FOREIGN MARKETS

when, if they would only take the trouble to think for a moment, it must be patent to them that it is the foreign market which rules the home one and not *vice versa*. The grain merchant who purchases my oats asked me once, how it happened that I always sold to him just before a big drop took place in the price of corn. My answer seemed to surprise him. I told him that in my foreign papers I noted when a number of ships laden with oats cleared for this country and calculating as to the time when they might be due here, I sold the week in advance—before the importation had brought down the price. He seemed to think that I exhibited a vast amount of cleverness in so doing, but I myself fail to see it in that light, merely considering my action as that of one of ordinary common-sense. There are some who might object to doing as I did with regard to the purchase of feeding sheep as being of too speculative a nature; but speculation enters into every action that one does, even to going to church. How often does not put a rupee into the plate at the door of the Kirk, fondly hoping to hear in return a sermon worth more than that sum, and yet finds that the discourse which he is favoured with cannot be valued by the most liberal of valuators at more than two annas! In another case, however, my foresight was at fault. I read, in my New Zealand papers, that owing to the war

THE PRICE OF OATS

in that country had gone up with a bound from 8s to 16s per quarter, and naturally I concluded that we home farmers would benefit also, so I held my crop for a rise. Alas! however, the rise never came, and rather than sell at the price offered by the grain merchants, I fed my sheep on oats, and refused to buy feeding stuffs from the dealers; so that they, by refusing to give us the rise which we were justly entitled, to lost two commissions, one on the purchase of grain, and one on the sale of feeding condiments. I speak in the plural because I succeeded in persuading many of my neighbours to do as I myself was doing, and so this has not been a very successful year for the grain merchants, who, no doubt, will bear this in mind when we have another little war on our hands, and when, I hope, they will give us poor down-trodden farmers, the rise in the price of our grain to which we may be considered justly entitled.

PLANTING IN SUMATRA.

NOTE FROM SERDANG : EAST COAST OF SUMATRA.

The Coffee Dealers are having a long innings this time at the expense of the unlucky producer. Four years or so ago, Liberian Coffee was quoted for a considerable time in Singapore at $45 per picul of 133⅓ lb, the top price touched, if I remember right, being $57·50. Then without a word of warning, it went "just plunk," as they say in Drumtochty, to $16 and slowly recovering to about $20 has remained there or thereabouts for a weary enough time. For a few days last January and February it received to about $25 and many of us were then hopeful that the cycle of low prices was at end, and better days were in view: but it appears that we were mistaken and the last Singapore quotation is $19 only. Verily pride goeth before a fall, and a haughty spirit is brought low by over-production. It has however been proved that a stand-out lot will always command its own figure in Europe, and the secret of a good sample of Liberian Coffee is quick drying.

Our stand-by in Serdang as I have written before is

CROPS.

These continue abundant, and low prices are not such a serious matter as they would be in less favoured parts. Pests are fortunately almost unknown. The foe H V is like the poor in that it is always with us. But, thanks be, our poor are few and far between; and no one's rest is as yet disturbed by dreams of leafless estates. The conditions are much in our favor. The soil is, as I have often remarked, first class, and there is no overcrowding. The total area under coffee in not 15,000 acres, and all this is interspersed with jungle, big and small, and lalang.

It is worth noting that a bad tree is invariably bad

FROM THE ROOTS.

Be it bad with leaf-disease, canker, or even attacked by caterpillars, pull it up and you will find the roots either double fanged, cork-screwed, bumble-toed, or club-footed. To me the most remarkable thing is the avoidance of healthy trees by caterpillars. We have no Egyptian plague of these, as in the Native States a year

or two ago, but occasionally there is a small visitation of a beast that appears to be the same as the cinchona caterpillar which wrought such havoc in Ceylon in years gone by. But in no single instance have I known it attack a healthy tree. It is ever useful in young coffee in drawing attention to "wasters" which otherwise might escape notice. Out with such an one, and, as sure as cows have tails, the roots will be found defective.

It should further be remembered that here in Serdang, coffee is a comparatively new introduction and its natural enemies when attempting to establish themselves find, owing to the richness of the soil, such a lusty bush, that they can make little or no impression on it, and retire discomfited. I may in fact say that a bad plant is only owing to bad planting.

W. T. M'K.

10th June.

IMPORTATION OF TEA INTO FRANCE (EXPORTS DEDUCTED.)

[Extract from *Le Travail National*, 13th May, 1900.]

Years.	Kilos.	Increase per cent.
1880	408,000	100
1881	438,000	107
1882	456,000	112
1883	491,000	120
1884	523,000	128
1885	473,000	116
1886	542,000	133
1887	543,000	133
1888	491,000	120
1889	523,000	128
1890	603,000	148
1891	602,000	147
1892	645,000	158
1893	676,000	165
1894	692,000	169
1895	718,000	174
1896	754,000	184
1897	765,000	187
1898	826,000	202
1899	876,000	214

Remarks.—This represents the excess of imports of tea into France over exports. Much tea is imported into France and held in Bond in Marseilles and elsewhere for exportation to Switzerland, Spain, Italy Algeria, Morocco and Dahomey. Some even goes to Turkey. None of them is shown, nor does it shew the country of origin.

The Banana and Typhoid.—The uses of the banana are claimed to be many and various. The latest is both unique and important. According to the belief of Mr. William C Usery, M D of St. Louis, the banana is the very best food obtainable for typhoid fever patients. In this disease he explains, the lining membrance of the small intestines becomes intensely inflamed and gorged. Eventually it begins sloughing away in spots, leaving well-defined ulcers. At these places the intestinal walls become dangerously thin. A solid food, if taken into the stomach, is likely to produce perforation of the intestines, and dire results will follow. Therefore, solid food or foods containing a large amount of innutritious substances are dangerous, and are to be avoided. The banana, although it may be classed as a solid food containing as it does 95 per cent nutrition, does not possess sufficient waste to irritate these sore spots. Nearly the whole amount taken into the stomach is absorbed and gives the patient more strength than can be obtained from other food.—*P M Herald*, June 20.

INDIAN TEA SEASON 1990.

PRACTICAL CRITICISM OF CURING AND MARKET.

The two opening sales of the season have, so far, not done much to raise a planter's spirits, for the prices obtained are very near the cost of production, in some instances below. The brokers say that, so far, no good teas, or teas of special merit, have as yet turned up, but we fail entirely to see how this can be the case from all districts. It is quite possible that one or two districts might show inferior quality, but the universal condemnation takes us somewhat aback. If it is true, the sooner an enquiry is made into the cause the better it will be for the industry, and at present an excellent opportunity for the New Agricultural Chemist just arrived for proving his merit. We can scarcely put it down to our planters having lost their cunning, for every year sees them supplied with new machinery, supposed to be of a modern and better type, and with closer attention to plucking and cultivation, we must say, we fail to fathom it. In former years Assam teas commanded a very much higher average than the other districts, but sales so far this year bring those down to the level of Cachar and Sylhets, and considering how much more expensively the Assam Valley gardens are worked than those in the Surma Valley, the same prices spell ruin. In former years, there were many notable marks in Cachar especially, that commanded Assam prices, but, lo ! the mighty have fallen also, and those marks which it would be invidious to mention are down on a level with the "ruck" Can the brokers or agents explain how this phenomenon has come about ? for phenomenon it is. The teas, so far as one can judge by appearance, are as good as ever they were, yet they don't bring the money —and this is the main thing. Has the exhaustion of the soil anything to do with it? Have the seasons changed, or what ? There is no doubt the chemistry of tea is in its infancy yet ; but still, we fail to see how teas turned out in identically the same manner, with better machinery, fetch annas less per pound than they did even, say, a couple of years ago. Has anything gone wrong with the new machinery that the planter did not bargain for? Do the new dryers not retain the volatile oils so well as the old ones, or what? The brokers may, we allow, underestimate the dullness of the market, but they cannot surely do this so much as the extent of the drop in prices would lead one to believe. Allowing for a drop of, say, two or three annas within the last three years, *i.e.*, about an anna annually, the average price of the whole crop sold in London does not indicate this over all : but it is most distinct in particular cases ; and it is this we would like to see explained away satisfactorily. Has the new drying machine deteriorated the leaf in manufacturing, producing only what a broker would call a *dry* tea, *i.e.*, a tea without much in it ? Another point worthy of consideration is the amonnt of rolling given. This has been gradually increasing until now nearly double the time is given on the rolling table to what was a few years ago. Has this extra rolling anything to do with the poverty in cup ? We do not say that these, or any other processes during manufacture (to which we may allude), are answerable for the poor teas now being produced ; but merely suggest them as points for our practical planters to consider and weigh well. There has been also a great craze for cool fermentation or oxidisation, but we do not know how far the industry has been benefited by it, or

if any planter could say what actually has been the benefit. Then, again, the planter may be wrong in his modes of cultivation, and thus tend to weaken the bush; but this question should soon be set at rest by Mr. Mann, who has come out from home with very high certificates of merit, and there is no doubt there is ample scope for his abilities in the different districts, and it is fortunate he has been engaged for a number of years. A few years ago, when *bhil* gardens were opened up, there was a great hue and cry about their produce, that there was nothing but water on infusion in the cup, &c., but if one looks over the sales nowadays there is nothing like the difference existing in price that used to be the case; and Sephinjuri Bheel Company this year, with between a 6d. and 7d. average, have done almost, if not quite, a record in profits. Undoubtedly the 2d. per lb. extra duty has had a good deal to say to the great depression now existing; but we consider this is now as much below reality as the opening sales of 1899 were above that, and although we do not think 1900 will be a record year for prices, we think that prices just now are unduly depressed, considering that the figures of export are only about half last year, and are probably a true index of the state of manufacture in the districts. The Dooars are all behind, we believe, as also many parts of Assam, Cachar, and Sylhet, which, as we are now getting well into June, means an average crop; at any rate not a bumper one like last year. With the war now nearly over we hope the market may look up a little; but we trust our planter friends will try and solve the reason of the poorness in cup, and be able to counteract it, either by other modes of manufacture, or improved methods of cultivation, or both combined.—*Indian Planters' Gazette.*

TEA WEIGHING IN LONDON.

NEW CUSTOMS REGULATIONS, 1ST JUNE, 1900.

The following is the wording of the Customs General Order 42-1900 *re* Tea Taring, which came into force on the 1st June, 1900.

"When the scales have been carefully balanced, a half pound weight is to be placed in, or attached to, the weight scale; the weight of the packages must then be taken to the pound only, the weight scale preponderating according to the usual practice in taring. The half pound weight placed in the scale is to be ignored in recording the tare."

Tares.—In order to obtain full benefit from this new regulation, Managers should arrange that the weight of the empty packages (including, lead, nails, screws, bands, etc.) should be SOME 3 OR 4 OUNCES *under* THE HALF POUND, say for example, 20lb. 5oz. The Customs would then take the weight of the package as 20lb.

Gross Weight.—Having made the tares of an equal weight, the package should be filled with as much Tea as it will conveniently hold, the gross weight to be A FEW OUNCES *over* THE POUND.

There being no occasion for the net weights to be alike, it is unnecessary to crush the Tea into any particular package.

As the Customers disregard all odd ounces in weighing gross, it is not to the advantage of the Producer for the package to weigh many ounces over the pound, four or five being sufficient to allow for evaporation, leakage and variation in scales.

The following are examples of good and bad packing under the new Customs methods of weighing:—

GOOD PACKING.

	lb.	oz.		lb.
Actual gross weight of package ..	124	4	Taken by Customs as	124
Actual Tare of package	24	4	do do	24
Actual net weight of package ...	100	0	Taken by Customs as	100

there being no loss in weight, a condition which could never have occurred under the previous method of weighing, the odd ounces both in gross and tare having been given against the Producer; these totalled from a few ounces to nearly two pounds, irrespective of the one pound draft allowance.

BAD PACKING.

	lb.	oz.		lb.
Actual gross weight of package ...	124	15	Taken by Customs as	124
Actual Tare of package	24	9	do do	25
Actual net weight of package ..	100	6	Taken by Customs as	99

showing a loss of as much as 1-lb. 6-oz., besides the 1-lb. trade draft.

Gow, Wilson & Stanton, *Tea Brokers*, London, E.C

"Tropical Agriculturist."—Planters and others who have preserved the back numbers of volumes of this publication will be glad to learn that the long-desired "Topical Index" to the whole 19 volumes will shortly appear and a copy will be forwarded to each subscriber.

Reasoning Power of Plants.—Do plants reason? This seems a strange question but it is asked by the daughter of a prominent Mexican planter, who has been making a series of experiments, and publishing the results in a Mexican newspaper. Among the many experiments made by this young lady naturalist of Mexico the most suggestive was made with a morning glory plant. This young lady drove a nail in the wall some distance from the tendril of a morning glory plant. The tendril began at once to grow toward the nail. The nail was shifted; the tendril shifted its course. Five times the nail was shifted, and five times the tendril shifted its course. Finally a cord was hung up to tempt the tendril, and it shifted its course toward the cord and left the nail which it had five times persisted in following. The young lady asks: How did the plant know that the nail was there? And how did it know that the nail was shifted? When the cord was stretched at an equal distance away, how did it know the difference between the cord and the nail? She also asks: Why do the tendrils of the morning glory prefer a cord of continuous support, such as a cord, wire, or lath, or rail, rather than a peg or nail, which does not give this continuous support? Why when presented with on equal choice between the two, will they invariably choose the continuous support? After asking a series of questions logically springing from the facts cited and others, she concludes by asserting that plants really reason.—*Indian Gardening.*

THE TEA MARKET.

ANNUAL REVIEW.

38, MINCING LANE, June, 1900.

The issue by the London Brokers' Association of statistics for the twelve months ending 31st May brings an opportunity of looking into the position and prospects of tea, and of trying to find out what light the past seasou throws upon the future.

The task is rendered difficult by the unusual events which have occurred to disturb the regular course of business and to place the figures relating to consumption in a position which makes them for a time of little value for the purpose of comparison with statistics of previous years.

At the beginning the position was a strong one. The increased use of Iudian tea during 1898-99 had reduced stocks to a low point; had raised prices for both Ceylon and Indian to a level which promised well for growers; and had made it evident that larger supplies could be taken here, and were necessary in order to satisfy the demands of other markets. For reasons connected with the nature of the competition among distributors, which we explained at the time, prospects were then especially good for planters who could secure heavy crops at a low cost price, and for those who could produce tea of fine quality. These prospects have for the most part been realized; but results have been very irregular, and the unequal distribution of the good profit attaching to the production of tea has caused embarrassment, and disappointment to many who have been accustomed to rely upon the security of an average yield of good medium quality.

The hope of an active business at the outset was deferred by the dispute arising from the proposal to do away with the 1 lb. draft. A settlement based upon a compromise was agreed upon, but when this was found not to be acceptable to all concerned, Her Majesty's Customs declined to carry it out in face of the objcctions raised.

A new and more equitable method of

WEIGHING THE CHESTS

has however, at length been adopted, which should to some extent lessen the loss in weight sustained by Importers. It is a difficult matter to recoucile conflicting interests when touching customs of trade, especially when, as in this case, they have the prescription of nearly a century's usage, being based upon the "East India Conditions" prevailing in the days of the old Company.

The friction caused by the dispute subsided, but business was interrupted and a counter-combination was organised by the buyers. To meet this, concerted action on the part of the Indian Importers followed, in order to control the quantity brought to Auction —while the Ceylon Importers, having to deal with a crop arriving all the year round, preferred to go on selling as before.

Opinions differ whether the regulation of the

INDIAN AUCTIONS

has been beneficial. It was probably instrumental in maintaining quotations for common teas, notwithstanding the great increase in their production —which is held by some to account for the decline in the value of good medium grades—but it has not been altogether agreeable to those who had to keep back tea that it was inexpedient to hold. We doubt, however, if the average value of the crop has been affected, for subject to variation in quality this must always depend upon the relation which the total supply bears to the total requirement, and not upon mechanical arrangements governing a week's or a month's sales.

When free supplies were eventually brought to sale the usual active autumn trade developed, marked by the high prices paid for a while for fine tea, and by the anomaly of declining prices for good medium kinds whilst common sorts were rising above the level of last season. Later on came the unfortunate catastrophe in Darjeeling; the signs that production, stimulated by the high price of common tea, was exceeding estimates; and the sharp advance in the Bank rate—affecting the stability of the market.

In January and February the large purchases made by those who anticipated an increased duty enabled importers to sell freely though prices were gradually weakening: but they had not sold enough when the premature announcement of the Budget brought business to a standstill. The incidents connected with the Budget are too recent to need recapitulation, beyond recording that the strain upon the Trade's resources entailed by the clearance of some 40 million lb. in advance of requirements left them unready buyers and was followed by changes in price adverse to holders.

Some time may pass before the effect of the

ADVANCE IN DUTY

becomes clear. The fall in the value of inferior kinds since the Budget is a natural result of superabundant supply, and has, we think, no connection with the higher duty, which would be more likely to increase the demand for the cheaper sorts if, as we fear may be the case, distributors find that owing to the advance in the retail quotations their sale of low-priced teas increases at the expense of those of higher value.

It is so difficult to find a reason for taxing to the extent of 75 per cent of its value a product of British industry now regarded as a necessary of life to the working classes, that reduction of the tax will naturally be expected when the emergency is past; we must, therefore, be prepared for interesting if somewhat restless markets in the future before each successive Budget day.

In the meantime we do not fear any serious reduction in the quantity actually used here, because tea is such a cheap and wholesome beverage,—but hand-to-mouth trading will be more than ever the retailers' policy, and may cause some shrinkage in the quantity cleared. The range of value will depend upon the character and dimension of the crops. It will be well if they are of somewhat higher class than the last crops, for if the supplies show a large increase two years in succession, failing the attraction of better quality, lower prices will be needed to draw buyers and stimulate trade. It must not be forgotten that every producing country has increased its contribution to the world's requirements—the total increase being more than 50 million lb.—and that no market is now likely to be short of stock.

Writing a year ago we intimated that we could use a total of 275 million lb. Had our importations been confined to that or a little more, producers would have done extremely well, notwithstanding high rates of exchange and freight; but 300 millions have been sent (weighing in London 293 millions), an increase of 32 millions upon last season's supply, which has proved to be more than the market could absorb without a reduction in the average value.

It is not certain to what extent

HOME CONSUMPTION

has expanded during the year, the increased clearances since 1st January being misleading. Taking the Board of Trade returns, as the most complete, it is seen that from 1st June to 31st December there was an increase of four million pounds in the quantity duty paid, being at the rate of about seven millions per annum; but during that time common teas were so dear that retailers were working on the smallest stocks possible, we, therefore, think that the increase may have been as much as ten million pounds during the year, an opinion to which the very prosperous condition of trade and industry lends support. On this assumption, had nothing occurred to disturb the figures we should now be recording that about 278 or 280 millions had been used at home or sent abroad, and that in place of the inadequate stocks held a year ago we had now in hand only the supplies necessary for working a trade of the large dimensions now reached.

Believing this to be a reasonable estimate of the position, we contemplate with composure a total im-

portation of 285 or 290 million lb. during the coming season, to include about 150 millions from India, about 110 millions from Ceylon, with 25 or 30 millions from China and Java. This would seem to be as much as will be required; unless, therefore, some limit of production be found, it will be necessary to dispose of larger quantities of Ceylon and Indian tea abroad in order to avoid an over-supply here. The probabilities are that a limit will be reached by natural process, and that neither India nor Ceylon will for the second time give a yield largely in excess of expectation; there is not, moreover, the same inducement to pluck freely as there was a year ago, when common teas were 1d to 2d higher than they are now.

The possibility of

HEAVIER SHIPMENTS FROM CHINA

is a contingency, its total export having recovered from 107 millions in 1898-9 to 115 millions in 1899 1900, but there is little reason to fear it, seeing that the quotation of 6d. for common tea ruling here last year did not attract very much more than when the price was 4½d. The fact is that retailers only use it in the last resort, and *good* China tea cannot be obtained cheaply enough or in sufficient quantity to affect the position. Japan continues a strenuous competitor in the States and Canada, but not elsewhere. The produce of Java finds increasing favour now that so much grown from Assam seed is coming in: the shipments were nearly 13 millions in 1899.

We record with satisfaction an increase in the amount of business transacted by

PRIVATE CONTRACT

sometimes at separate quotations, sometimes at an all-round price, and chiefly in low or medium grades sent in large lines, negotiations over the smaller quantities of finer tea being usually too prolonged to enable much business in these kinds to be adjusted in the time at the disposal of buyers. The drawback of being tied to the Auction Room and the advantage of an alternative have been realized, and it is seen that a free private-contract market open to any sellers wishing to make use of it would lessen some of the difficulties that meet them.

The

STATISTICS

at foot speak for themselves, and disclose a larger business at a lower average price, with steady, if not rapid increase in the Colonial and foreign demand for our teas. With the permission of our friends we add the particulars of some of their Indian crops sold in London.

Wm. Jas. & Hy. THOMPSON.

Summary of the exports to all parts from the several sources of production:—

	1898.	1899.
From Indian (season) ..	157.210.000	175,000,000
Ceylon do ..	119,000,009	138,000,000
*China do ..	107,000,000	115,000,000
Japan (year) ..	40,500,000	45,830,000
Java do ..	9,720,000	12,850,000
	433,430,000	486,680,000

* Not including about 34,000,000 lb. sent overland to Russia, and 64,000,000 lb. of Brick Tea sent abroad in 1899.

SUGAR AND PINEAPPLES.

We extract the following from the report by Mr. Chas. Ford, Superintendent of the Botanical and Afforestation Department:—

Forestry.—Planting to the extent of 54,582 trees has been continued in the island, and Kowloon in ten different localities, and in various new and old roads where trees would thrive.

NEW TERRITORY.

His Excellency the Governor when travelling in the territory came to the conclusion after seeing the Sugar-cane growing there, that new varieties of cane might be introduced, and at His Excellency's request I have made arrangements for new varieties to be obtained from different countries, some of which have arrived and been planted near Ha Tsun.

His Excellency also obtained two Chatanooga Sugar Mills, which this department had fixed in the new territory, and exhibited the working of to the sugar-growers there. The advantages these mills possess over the native mills may lead to their extended introduction.

I have also obtained improved varieties of Pineapple-plants from Ceylon, which will be useful introductions to the districts where Pineapples are now cultivated to a considerable extent. The best fruits from the new territory are now brought over to Hong-Kong, and canned at a factory at West Point.—*Gardeners' Chronicle*, Jnue 23rd.

BRAZIL COFFFEE NOTES.

A correspondent writes to the *Imperio* that the coffee crop along the lines of the Paulista railway is small and of inferior quality.

A telegram of the 25th instant states that the S. Paulo coffee crop has heen injured hy heavy rains. In districts in which the gathering of the crop had commenced the loss is estimated at twenty per cent.

It may be confidently assumed that the losses incurred in the coffee market through the imposition of quarantines on account of the bubonic pest will have to he horne by the planters. The heavy crops and the large stocks in consuming markets will give the buyer sufficient advantage over the seller to enable him to dictate terms.—*Rio News.*

THE INDIAN TEA TRADE.

The export figures for the year 1899-1900, ending 31st March, are as follows in the Indian Customs Accounts:—

12 MONTHS, 1ST APRIL TO 31ST MARCH.

	1897-98.	1898-99.	1899-1900
Tea—	lb.	lb.	lb.
To United Kingdom	137,655,857	139,245,995	154,161,492
Russia ..	689,271	500,889	467,451
Canada ..	593,532	1,044,256	1,932,943
United States ..	929,704	1,413,624	2,744,854
China ..	565,274	883,307	1,248,857
Persia ..	1,464,394	3,456,791	1,953,900
Turkey in Asia..	1,336,970	2,598,281	2,149,414
Australia ..	6,792,654	6,306,135	8,362,797
Other Countries	1,424,161	2,021,394	2,016,419
Total lb...	151,451,817	157,470,672	175,038,127

For imports we have:—

12 MONTHS, 1ST APRIL TO 31ST MARCH.

	1897-98.	1898-99.	1899-1900
Tea—	lb.	lb.	lb.
From Ceylon ..	1,059,716	1,108,686	570,161
China ..	1,689,561	1,751,653	1,921,826
Other Countries	765,733	799,103	711,124
Total lb. ..	3,515,0 3	3,659,442	3,203,111

Tea, Cinnamon, Coconuts and Rubber.—Mr. Vigors, in his Administration Report on Kalutara District for 1899, states that about 300 acres were added to the area in Tea, and 297 to that of Cinnamon, about 50 acres of Coconuts; while Para Rubber was freely put out in tea and special lots were likely to be bought to be planted this year with Rubber.

ADVERTISING OF INDIAN TEA.

AMERICAN AND FOREIGN MARKETS FUND.

Indian Tea Association,
Royal Exchange Building, Calcutta, 16 June.
(TO ALL PROPRIETORS AND AGENTS OF TEA ESTATES.)

Dear Sirs,—I am now directed by the General Committee of the Indian Tea Association to invite contributions from All Proprietors and Agents of tea estates to this Fund for the year 1900-1901.

2. During the past year the Committee of the Association in London in administering the Fund, and in projecting measures for future work, have devoted their attention mainly to three objects. Firstly, to the continuance of the work in America; secondly, to the best means of developing the tea trade on the Continent of Europe; and, thirdly, to the effective representation of Indian tea at the Paris Exhibition.

3. The work in America has been carried on by this Association conjointly with the Ceylon Association. The representative in the United States of the latter body—Mr. W. Mackenzie—has acted during the year as joint agent of the both Associations. His efforts in behalf of the industry have been eminently successful, the quantity of Indian and Ceylon tea taken by the United States and Canada in 1899 being 17,226,000 lb., as compared with 13,609,000 lb. in 1898. This is, the Committee think, a most gratifying increase; and they propose to continue, and, if possible, extend their operations in the coming year both in the United States and in Canada. They will again co-operate with the Ceylon Association; and they are confident that the satisfactory results of the past year will be repeated.

4. The second main object which the London Committee have kept steadily in view throughout the year is the development of the markets in the various countries of Europe. To that end they have deputed Mr. J E Musgrave Harington on a mission of enquiry into the conditions and prospects of the trade in Russia, Germany, Turkey, Greece, Italy, Holland and elsewhere. Mr. Harington is making special enquiries into the facilities now existing in those countries for supplying tea; and also into the question of the possibility of increasing the demand for it. On receiving his report the London Committee propose to follow it up by active measures of exploitation on lines somewhat similar to those adopted in America by Mr. Blechynden. That is to say by an extensive system of advertising; by assisting those already engaged in trade; and by establishing new agencies at places as may be deemed advisable.

5. The work which is being done in connection with the Paris Exhibition is so well known as to need only a passing reference. Every effort is being made to direct the attention of visitors to the Exhibition to Indian tea, and to encourage them to use it. Facilities are also afforded to purchasers for obtaining supplies outside the Exhibition. There is good reason to hope that, as a result of the representation, a considerable impetus will be given to the consumption of tea in France, where at present the trade is comparatively insignificant.

6. I am now to turn to the question of the increased production of Indian and Ceylon teas, which in the opinion of both the London and Calcutta Committees, constitues the chief reason at the present time for extending consumption in foreign markets. From the figures * it will be seen that while production during the past five years has increased by 30 per cent., consumption in the United Kingdom has risen by only 15 per cent. With an enhanced import duty there is not the smallest ground for assuming that in the near future consumption will show a more rapid rate of increase But, on the other hand, it is practically certain that the production of tea will be considerably augmented in the present and following seasons. The extensions now coming into bearing, and the more general application of scientific principles to cultivation, leave little room for doubt as to the accuracy of this assumption.

7. It is therefore evident that unless vigorous and determined measures are now taken to stimulate consumption in countries other than the United Kingdom, it will soon be impossible to avoid an overstocked market and lower prices in London. That those evils should be avoided is essential to the well-being of the industry; and the Committee accordingly now appeal to all Proprietors and Agents to contribute in behalf of the gardens under their direction in order that a comprehensive foreign market programme may be undertaken. What that programme is to be has already been indicated; and ample funds will be required if it is to be carried out in an efficient and satisfactory manner.

8. The Committee would particularly appeal to all Proprietors and Agents who have hitherto held aloof from the Fund. That the extension of consumption in foreign markets has now become a matter of vital importance to the industry has already been shown; and it is therefore clearly necessary that the measures now being taken by the Association to promote that extension should be supported by the industry with complete unanimity. By no other means can success be fully achieved; and as the resulting advantages are shared proportionately by all, it is but reasonable that the funds required should be similarly raised.

9. The basis for contributions will be the same as in previous years, viz.:—

4 annas per acre on the area under cultivation; and
½ anna per maund on the production;

and I am to ask if you will be good enough to intimate not later than the 15th August next on the subjoined form your willingness to support the Fund on this basis.

Yours faithfully, W. Parsons, Secretary.

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* PRODUCTION IN MILLIONS OF LB.

		India.	Ceylon.	Total.
1895	..	135	98	233
1896	..	148	108	256
1897	..	148	116	264
1898	..	153	120	273
1899	..	175	130	305

CONSUMPTION IN THE UNITED KINGDOM IN MILLIONS OF LB.

		India.	Ceylon.	Total.
1895	..	116	74	190
1896	..	123	80	203
1897	..	125	85	210
1898	..	133	83	216
1899	..	134	85	219

—*Indian Planters' Gazette.*

CEYLON SHARE MARKET: VARYING VALUE OF SHARES.

VALUE OF SHARES BETWEEN JULY, 1899 AND JULY 1900.

Name of Company.	Amount paid up.	Value per Share 1st July, 1899. (Share Report 30th June.)	Value per Share on 1st Jan., 1900. (Share Report Jan., 5th.)	Value per Share on 2nd July, 1900. (Share Report June, 29th.)
CEYLON PRODUCE COMPANIES.				
Agra Ouvah Estates	500	950	1000	900 B
Castlereagh	100	100	95	90
Ceylon Hills	100	30	30	—
Ceylon Tea & Coconut	500	500	500	500 (noml.)
Ceylon Provincial	500	500	500 B	500 T
Claremont	100	15 B	25	—
Clunes	100	95	100	—
Clyde	100	90	70	40 B
Doomoo	100	70	60 B	65
Drayton	100	135 B	150 B	—
Eila	100	50 B	62½ B	60
Estates of Uva	500	350	300	225 B
Glasgow	500	962½	925 B	935 T
Great Western	500	640	640	640 B
Gangawatta	100	—	—	—
Hapugahalande	200	250	275	200 B
High Forests	500	550	570	525
Do. part paid	350	400	400	400
Horrekelly	100	85	—	—
Kalutara	500	400	390 B	360
Kandyan Hills	100	47½	70	67½
Kelani Tea Garden	100	65	50	40 B
Kirklees	100	140 B	145	120
Knavesmire	100	77½	—	65
Kanapediwatte	100	90	100	90
Maha Uva Estate	500	575	500	425
Mocha	500	700	—	600 B
Nahavilla	500	500	475 B	450
Neboda	500	—	500 B	500
Ottery	100	110 B	—	—
Palmerston	500	425	415	400
Penrhos	100	107½	100	95
Pine Hill	60	50	50	42½
Pitakande	500	1,000 B	1,000 B	—
Putupaula	100	100	120	—
Ratwatta Cocoa	500	350 B	—	—
Rayigam	100	55 B	70	55
Roeberry	100	60	50	—
Ruanwella	100	75	70	40 T
St. Helier	500	505 B	500 B	510 B
Talgaswela	100	32½	25 B	—
Do. 7 % Pref.	100	70 B	—	—
Tonacombe	500	450	450	450
Udabage	100	65	—	—
Udagama Tea & Timber	50	10	10	—
Union Estates	500	300 B	300	—
Upper Maskeliya	500	500	500	470
Uvakellie	100	70	70	65 T
Vogan	100	90	87½	80
Wanarajah	500	1,150	1,145	—
Yataderia	100	380	375	375
CEYLON COMMERCIAL COMPANIES.				
Adam's Peak Hotel	100	60	40 B	—
Bristol Hotel	100	85	85 B	95 B
Do. 7 % Deb.	100	102½ B	105 B	107½ B
Ceylon General Steam Navigation	100	195 B	205	215 B
Colombo Apothecaries'	100	125	135 B	142½ B
Colombo Assembly Rooms	20	12½	12½ B	12½ B
Colombo Hotels	100	280	303	300
Colombo Fort Land and Building	100	80 B	92½	—
Galle Face Hotel	100	167½	147½ T	145 B
Kandy Hotels	100	80	112½ B	117½ B
Mount Lavinia Hotel	500	400	300	150 B
New Colombo Ice	100	162	172½ T	175 T
Nuwara Eliya Hotels	100	35	27½	30
Public Hall	20	15 B	15 B	15 B
Petroleum Storage Ord.	100	—	—	—
Do. 10 % Prefs.	100	—	—	—
Station Hotels, Kandy	100	40	30	30

NOTE.—B = Buyers, T = Transactions. The rest are Sellers' Quotations.

COORG COFFEE: RECORD PRICES.

Record prices were obtained at the public sale in Mincing Lane on the 22nd ultimo, when Messrs. R J Rouse and Co, put up seven bags shipped by Messrs. Morgan and Son marked "C I Palkimad" presented by Mr. Coolavandra Appiah, of Coorg, to be sold for the benefit of the Disabled and Wounded Soldiers' Fund. The lots were advertised to be sub-divided, if necessary, to suit the requirements of patriotic consumers, and they realised the following prices:—

Bag		cwt.			s.	
1	..	1	2	...	152	per cwt.
1	..	1	2	...	160	do
1	..	1	2	...	162	do
1	..	1	2	...	165	do
1	..	1	2	...	200	do
1	..	1	2	...	199	do
1	..	1	2	...	204	to 230

The last bag was divided into six lots, and the samples realised 5 shillings per lb. The sale began by a reference from the Chairman (Mr. Rouse) to the relief of Mafeking and to its gallant defence, in which the whole Empire took the utmost interest, the universal feeling being that what effected one portion of the Empire affected the whole—this being exemplified by this sale. Three cheers were given for Lieutenant-General Baden-Powell and his gallant garrison. At the conclusion of the sale, after singing the National Anthem, it was resolved that the best thanks of the coffee trade be tendered to Mr. Coolavandra Appiah for his donation, and the meeting concluded by singing "For he is a jolly good fellow."—*Madras Mail*, June 20.

A FARMER'S EVERY-DAY LIFE.

No. IX.

(By Cosmopolite.)

For some years now the burning question amongst agriculturists has been

"THE LABOUR BILL,"

which goes on increasing yearly in the same ratio that prices decrease for farming products.—which is another way of saying that a farmer is, in a manner of speaking, obliged to burn the candle of his capital at both ends. It is not that farmers grudge giving good wages to their servants, far from it, indeed they would gladly give them double the amount if the prices they obtain for their stock and grain would go up, so as to justify them in so doing. Residents in the cities complain that the agriculturists are all leaving the country and migrating to the towns, where they do the work at half the wages which formerly obtained there, but these grumblers don't—or wont—see that they themselves are to blame for the present state of affairs. If they would eschew from buying frozen tuberculous beef, from Australia, margarine butter, from the horse ranches of America, weevilly oats from Russia and the slops and refuse of other countries which are shot into our markets, as if Britain was the great dumping ground of the world, then farmers would be encouraged to cultivate more land at home than they do, would find employment for those men whose presence is objected to, in the cities, and thus there would be retained, in our own country, millions of money which, at present, goes to provide our enemies with the means of keeping up armies and navies for our undoing. I fear, however, that the dwellers in towns will not do anything of the sort; they prefer eating the cheap but nasty food of our enemies, even although they see their children, when fed on this offal, growing up a degenerate race, because it leaves themselves all the more money to spend in drink and amusements. It is a grievous thing to see men and women, who have been accustomed to farm work and the fresh air of heaven all their lives, driven to the towns for employment which they are not accustomed to, and to eat food which soon takes the colour of health from their children's cheeks, and causes themselves to seek, in drink, the forgetfulness of their own miserable existence of semi-poverty and of the poisonous atmosphere of their cheap lodgings in town. When I came to this farm the labour question was raging, and to reduce his labour bill, was the aim and object of every intelligent farmer. At that time no one in this district, had endeavoured to

REDUCE EXPENDITURE BY CULTIVATING LESS LAND,

so I, as usual, proceeded to do what my neighbours were *not* doing and at once laid down so much land in permanent grass, that I reduced the staff of labours, usual for a farm of this size, from 10 men to three, and from four pairs of horses to one pair. Of course my policy, at once, became the talk of the district—and contemptuous sort of talk at that—and several practical farmers spoke to me, in a friendly spirit, warning me against the errors of my ways, and telling me that from their own personal knowledge of my farm, it would never lie down in permanent pasture. That the last four or five tenants had all tried it, and that the grass had died out during the third year, compelling them to fall back on cropping. Whilst thanking them for their good advice, which I know was well meant and in all good faith, with the pig-headedness of the Scot, I went on my own way, and succeeded in laying down permanent pasture of excellent quality, which every year is improving, till at the present time, some that I have, which is 10 and 12 years old, now carries just three times the stock per acre to what it did when I took the farm. But perhaps my greatest triumph has fallen to my lot this year, when owing to a cold, hard and backward spring, the grass in the district can scarcely provide a bite for the cattle. In my case the old grass with its close sole, retains every drop of dew that falls which has helped on the grass, and the stock in my parts are wading in luxuriant feed, while those same practical farmers, who warned me against attempting to grow permanent pasture on my farm, have sent me 150 of their cattle to graze in my parks, paying me 2s a head per week, and this because their own barren pastures were starving the stock.

ANOTHER GREAT ADVANTAGE

which is derived from the laying down of permanent pasture, beside reducing the labour bill is found in the long rest which the land gets during the time it lies in grass, for; when put into crop again after a dozen years of grazing, the crop is generally found to be a double one, whilst the turnips which follow are not only a heavier crop, but are of better quality and free from all disease.

The month of June sees the last of the sheep-shearing in our district, a work that I am particularly fond of, reminding me as it does of those early days, forty years ago, when I learned the noble art in the back blocks of New Zealand and afterwards burst forth in Australia as a perfect "ringer" of the shed; and how pleasant are those thoughts, for surely one may be said to live twice who can enjoy the recollection of his former life! Farmers twenty years my junior, when they see me on the shearing-floor, going round a sheep with the old "ringer's" stroke of my youth, confess that they cannot buckle to such a job: that only a man with a first-class guttapercha back, with a hinge in the middle of it, need attempt that, hardest job a farmer can set himself to do. But to me it is work and pleasure combined and I hope I may long be able to hold my own with the shears. It may not be generally known that up to this time I have been, I believe, the only exporter of

WOOL FROM CEYLON.

It happened so long ago as in 1875, when a flock of fifty sheep arrived in Colombo from Australia and owing to the heat experienced during the voyage their fleeces were all hanging about them in tatters and they looked a disreputable lot indeed. I volun-

teered to shear them if I got the wool to myself and the agents gratefully consented to this. I sent a Tamby into the Pettah to hunt up a pair of shears for me, which after much trouble he succeeded in doing—an old blunt and rusty pair, but which I promptly got in working order—and next morning I polished off 28 of the sheep before breakfast, finishing the remainder on the following morning. The appearance of the sheep was so greatly improved that they fetched excellent prices, averaging 48s each, and I shipped the wool home to London receiving in due course, upwards of £10 as the nett result of the sale. Sheep have always been a specially attractive study to me, and I have been exceedingly fortunate in my dealings with them. Some years ago I noticed that, in our local markets, black sheep always fetched a better price than white ones, and being ever ready to take advantage of any such fancy on the part of the public, I determined to breed black sheep. At that time a pure Shropshire Down ram lamb was born on my farm, which could only be considered as a freak of nature, as it was jet black. This lamb I kept for stud work and mated it with a lot of Shropshire Down ewes, the result of which was about 80 per cent of black lambs. As these lambs came to maturity, they not only proved larger than ordinary Shrops, but gave heavier fleeces, and the wool realized a better price. The sheep themselves sold in the market at extraordinary prices and my black Shrops have now, for some years been celebrated in the district. Need I say that I have continued to breed these ever since, although the original ram has departed this life long ago and one of his descendants reigns in his stead.

No doubt readers of these notes will have remarked by this time, that my policy has always been to avoid the beaten track, and to farm in my own way. An article that everyone has for sale cannot be expected to give other than a very ordinary price ; but that which only one man has it in his power to place on the market, brings as a general rule, nothing short of a fancy price. While on the subject of sheep let me mention another operation in which I have proved most successful. About ten years ago farmers got an awful scare from the reckless way in which Government permitted cattle suffering from tuberculosis and pleura to be landed from America and the Continent, spreading disease all over Britain. Like my neighbours, I took fright and promptly sold off all my cattle, as there happened to be good prices agoing at the time, replacing them by purchasing sheep, which are not liable to take the diseases above mentioned. Then I converted my cattle byres so as to feed sheep in them, and proceeded to fatten these during the months of winter and spring, sending them to market at a time when few fat sheep are for sale, and consequently, prices rule high, and, by this means I have been able to turn off 300 to 400 fat sheep every winter. About 18 months ago the agricultural press went crazy on the subject of

THE HOUSE FEEDING OF SHEEP,

and since then the subject has been thrashed bare, each one giving his experiences, none of which, however, appear to me to have been very successful. Lately it has come to the knowledge of the public that I have been engaged in this work for ten years, and with great success, so I have been receiving letters from all conditions of men, asking my advice, and how to go about the feeding of sheep in the house, what food to give them, how to treat them, and in short, to tell them all I know on the subject,—so that they might go in and oppose me in the fat market. Not being a born idiot, I have succeeded so far in not giving myself away, but merely writing a few platitudes on the subject, winding up by saying that the only royal road to success in the house feeding of sheep is *to look after the work yourself.* Doubtless, in course of time, others will learn for themthemselves, as I did, and feeding sheep under cover will become as general as feeding cattle, and when that day comes, I suppose I will be obliged to pull myself together, and think of some other operation that my brother farmers are *not* doing, and set to work again in order to keep a few years in advance of those agriculturists who stick to the beaten track and the rule of thumb.

PLANTING IN STRAITS SETTLEMENTS: SELANGOR.

The acreage under European cultivation has been fully maintained in the face of a bad year and a large additional area has now come into bearing. It is to be feared that most of the native coffee plantations, which were started when prices were high and have since been abandoned, are now too far gone to be capable of resuscitation. Planters have paid much attention to rubber, especially the Para variety (*Hevea Braziliensis*), of which a number of plants approaching one million were put out in 1899. The trees have been in some places set out among the coffee, in others they are in plantations by themselves. The cultivation of the indigenous native rubber, Rambong *Ficus elastica*, has also received attention. When the prospects of Liberian coffee were at their worst, the cultivation of coconuts was resorted to as an alternative source of profitable planting. The industry has been steadily continued, both by Europeans and natives, and a reliable source of future profit thus brought into existence. The single estate upon which ramie has been grown is still in the experimental stage. The questions remaining for solution relate more to the nature of the machinery and the cost of preparation, than to the growth of the fibre. The proprietors are well satisfied so far as they have gone, and propose to further extend their operations in the near future.

As stated in an earlier paragraph, the European Planters have been striving against adverse market rates, as to which a measure of relief came only with the end of the year. That all should have persevered in the face of on apparently hopeless outlook reflects great credit upon our proprietors, and though it would perhaps be premature yet to predict that better times are in store for coffee, it is satisfactory to know that the difficulties which have had to be faced have created and fostered economical methods of working which will be of value to the estate owners for all time. Nor will the hardships which have been experienced be devoid of benefit if they have the effect of impressing upon the pro-

pretors of coffee lands the necessity of seeing that their produce is well cured in addition to being well grown. It appears to be admitted that insufficient attention was paid to this point in the past; that the prevalence of high ruling rates rendered growers less careful than they should have been of the condition of the exported article; but now that the Selangor Planters' Association has in its recently published annual report publicly called upon its members to co-operate in effecting an improvement in this respect, and that admonition has been productive of a generally expressed desire to obtain better machinery, we may reasonably expect that the produce of the future will no longer occupy an inferior place in public estimation on account of want of condition. So much capital is now being invested in rubber planting that it may be well that means should be taken, before the trees arrive at maturity, to acquire, possibly by examination in other countries, a practical working knowledge of the most effective and most economical methods of collecting, treating and shipping the produce. That which is new to planters in the Malay Peninsula is well understood elsewhere, and it would be a thousand pities that the supply of the future should be effected, either as to its quantity or quality, by the effort to acquire the necessary experience by unassisted endeavour.

Very little advance was made in native plantations in 1899. The scheme for the cultivation of rice by His Highness the Sultan, referred to in the Administration Report for 1898, still remains in abeyance. Rice growing in the district of Kuala Selangor has made some little progress, but the unhealthiness of the Coast districts has lately been such that all forms of industry have been somewhat suspended. Effective drainage works were again carried out in Kuala Selangor, and a commencement was made with the formation of the channels for the irrigation of a selected area of land in the Kuang district of Ulu Selangor, the whole of which will eventually be occupied by rice planters. A consignment of seed padi was obtained from Siam, and distributed among the districts for the purpose of improving this year's rice crop.

KUALA LANGAT DISTRICT,

RAMIE, COFFEE RUBBER, COCONUTS.

PROGRESS OF CULTIVATION AND RAMIE.—The progress of Mr. Cyril Baxendale's experiment in the cultivation of ramie constitutes one of the most interesting events in the agricultural history of Kuala Langat. On Jugra Estate there are now some 44 acres planted with several varieties of ramie; the largest of which attains a height of some nine or ten feet and flourishes with considerable luxuriance. My taking charge of the district was almost contemporaneous with the starting of this valuable experiment, and I have been much impressed by the thorough and business-like way in which it has been carried out. At the beginning of the year, a machine for producing fibre was worked on the estate. In September Mr. Baxendale brought out from England a machine to produce ribbons, and this appears to give satisfactory results. The experiment having occupied a longer period than was anticipated, an extension of the reserve of 2,000 acres granted in 1898 has been applied for. Amongst the ramie, coconuts, rubber and bananas are planted, and an additional 120 acres have been opened for the two former products.

RUBBER AND COCONUTS.—The other estates of 100 acres and upwards are extending cultivation by planting rubber and coconuts. For this purpose 80 acres at Bandar have been felled by His Highness the Sultan, and 120 acres are being opened on Klanang Estate, which will bring up the cultivated area on the latter estate to nearly 400 acres. On Denmark Estate rubber and coconuts are being planted amongst the coffee. Most applications for small holdings in the Jugra portion of the district are made on an undertaking to plant coconuts. Said Ahmit, son-in-law of the late Sultan, has felled and fenced for his purpose 70 acres of recently obtained land. But in many cases the actual planting has not progressed as quickly as I should desire. Owing to the number of wild pigs in the district, the planting of coconuts in small holdings, unless preceded by fencing, is a Sisyphean task; and I am afraid that many of the natives, more especially the Malays, have not yet sufficiently recovered from unfortunate ventures in the cultivation of coffee, to brace themselves for another serious agricultural effort.

COFFEE.—Those cultivators whose coffee was well advanced before the slump in prices have kept their gardens in a condition, which, under the circumstances, is surprisingly good; though I fear that comparatively few understand the economy of systematic weeding. Owing to the relative quickness of returns, coffee is a form of cultivation which, provided only that fairly good prices are anticipated, has considerable attractions for the native cultivator. In this connection, it is interesting to record the receipt in June of fifteen applications from Chinese for small holdings at Telok, made with a view to planting coffee as a catch-crop for rubber.

PEPPER AND GAMBIER.—The pepper crop on the Sepang Estate of the Chee Woh Kongsi amounted to 5,212.13 pikuls, as compared with 4,639.76 pikuls in 1898. The quantity of gambier collected was rather less than in the previous year, but this was partly due to a difficulty in procuring and keeping labour, owing to the much higher wages obtainable on the construction of the Labu Valley Railway. Encouraged by the high price of pepper, the owners of this estate are making additions and improvements to their pepper plantations. In January 214 Chinese applied for small holdings, of 25 acres or less, for the planting of gambier and pepper between the boundaries of this estate and the Labu River. The coconut trees round Jugra Hill are answering to systematic treatment and have greatly improved in appearance. In other parts of the district the beetle gives but little trouble.

COCONUTS IN KUALA SELANGOR DISTRICT, 1899.

I am glad to report that the cultivation of coconuts is largely on the increase. Wild pigs, however, do enormous damage amongst the younger trees and cannot in some places even be kept out by the ordinary sized "gagar" enclosing the plantation. I have been shown places, at Ujong Parmatang, where the young trees have had to be renewed perhaps four or five times before they have grown up. Barbed wire fencing would keep them out, but the

"raiats," are not sufficiently well off, they say, to bear the initial expense of procuring it.

The Selangor Coconut Oil Company's mill has been in working order throughout the year This district does not supply sufficient copra to enable the factory to keep going, but a certain amount is imported into Kuala Selangor from Jeram, Bernam and Telok Anson. I understand from the Manager, Mr. R S Meikle, that there is a ready sale for the "poonac"—the refuse of the copra when the oil has been extracted—it is used for feeding horses, cattle and pigs, and is, I believe, extremely nourishing. Most of it is shipped to Australia, but a portion is sold locally and in Kuala Lumpur.

The coconut beetle does not appear to do a great deal of harm, except in a few places in this district, and the provisions of the Enactment for the preservation of coconut trees enables the District Officer to deal with cases reported where owners have taken no measures for checking the inroad or increase of the beetles on their estates.—*Administration Reports.*

NEGRI SEMBILAN.

Planting in Straits.

From the Report for 1899 of Mr. E W Birch as British Resident, we quote a few passages:—

It is a pleasant duty to again report upon a year of great prosperity for the Negri Sembilan and my only regret is that the Coffee Planters did not share in that prosperity. Some valuable estates were sold at prices which must prove remunerative to the purchasers unless the cultivation of coffee is to be entirely abandoned, an eventuality which, in view of the ups and downs of the market for agricultural produce during the past twenty years, it is unnecessary to consider seriously. I am glad to state that the Coffee Curing Mill, which I have long advocated, has been established at Port Dickson. The price of Tin fluctuated between £89 and £150 per ton, remaining for about three months at over $80 per pikul. The average price for the year works out at about $72 and to it may be attributed a great increase in the Revenue of the State, very appreciable profits to the Miners, immense returns to the Farmers and a large influx of Chinese labourers. The Duty of Tin produced no no less a sum than $556,858, which is almost equal to the whole revenue of the State in 1897. It exceeded my estimate by over $330,000. The value of Tin exported was more than four and a quarter millions of dollars. The most satisfactory feature, however, is that the output was 57,300 pikuls, or 11,150 pikuls more than in 1898.

GREEN TEA MANUFACTURE:

PROCESS OF MANUFACTURE ON BRUNSWICK ESTATE.

(BY THE H. DRUMMOND DEANE SYSTEM.)

[Although already published, it is well at this time, to repeat these instructions again.—Ed. *T.A.*]

(I) Take the green leaf straight from the field and steam at once in Deane & Rae's Machine (a long narrow revolving box); full steam must be turned on for 5 minutes and then shut off, the leaf is then kept in a steam box for another 10 minutes, the box kept revolving meanwhile, in order that each leaf may get the full benefit of the steam. The leaf is then examined, and if found pliable (like slightly under withered leaf) it is taken out and spread on tats to drain off the superfluous water; if the leaf is not found to be sufficiently pliable another 2 minutes in box should be allowed. Some time should be allowed for draining off the water.

(II) A suitable quantity is then taken to the roller and rolled for half an hour *lightly*, after being discharged, all lumps (of which a great many will be in evidence) must be carefully broken by hand, or it may be put into dryer for a short time before going to roller.

(III) The roll is then taken to the drier and partially fired to rid it of excess of moisture, care being taken not to allow it to become crisp.

(IV) It is then rolled again for one hour. Owing to the brittle quality of the leaf after it has been submitted to the steaming process, it is not possible at any time to apply weight to it in rolling. After discharge from roller, the leaf must be again carefully broken by hand.

(V) Then final fired. This last operation must be thoroughly completed, care however being taken that temperature is not allowed too high (say D.D. Sirocco 210 degrees to 220 degrees should be the maximum), as the leaf very easily *blisters*, also a "toasted" flavour (which is objectionable) may be imparted to the tea. Firing should be as brisk as possible, as it adds to the pungency of the tea, the points mentioned above being carefully observed.

SIFTING PROCESS.

The bulk is first passed through a

No. 12 sieve and called young Hyson

then ,, 10 ,, ,, Hyson

,, ,, 8 ,, ,, Hyson No. 2

and what remains on top of No. 8 has to be broken through it.

Dust from Young Hyson should be mixed with the lower grades.

There should not be more than from 10 to 12 per cent of dust altogether from the other grades, which is called "Twanky," and is sometimes mixed with Hyson and Hyson No. 2.

AMERICA'S NEW POSSESSIONS.

ENORMOUS GROWTH OF AMERICAN TRADE.

Here are figures showing how American exports to Cuba, Porto Rico, Hawaii, and the Philippines have grown in three years:—

Fiscal Years.	Cuba. Dollars.	Porto Rico. Dollars.	Hawaii. Dollars.	Philippines. Dollars.
1898	9,561,656	1,505,046	5,907,155	127,804
1899	10,619,377	2,685,848	9,305,470	404,193
*1900	25,000,000	3,600,000	14,500,000	2,500,000

* May and June, 1900 ,estimated.

—*Sell's Commercial Intelligence.*

Electric Light on a Perak Sugar Estate.—What is believed to be the first electric lighting plant in Perak, was installed in Gedong Sugar Estate, Begau Serai, a few days ago. It is working most satisfactorily. The above Estate, expects to receive very shortly, the materials for a factory of the latest type, the mill and crushing plant of which, will be the largest ever imported into the East, with a new type of evaporators and crystallizers, altogether capable of turning out about 40 tons of sugar daily.—*Perak Pioneer*, June 20.

THE MANUFACTURE OF "GREEN TEAS" IN CEYLON.

No one has a better right to discourse on the subject of pure "green" teas in connection with our Ceylon industry than Mr. Drummond Deane; for the pages of our *Tropical Agriculturist* bear witness to the fact, of Mr. Deane having been about the very first to experiment in the manufacture of green teas and to offer to instruct his brother planters in regard to the same. If we are not mistaken, Mr. A. E. Wright got his first lesson from his neighbour, the whilom "laird of Kintyre."

We direct attention to the long letter on the subject which has reached us from Travancore. In it Mr. Deane refers to his early experience as a maker of green tea; to the great praise given, both locally and in America, by experts as to the quality of his product, and to the faet that he had brought out a small patent in connection with the preparation. But when all is said and done, we may ask what came of the industry which was then the subject of so much encouragement and praise? It is quite evident that it would not have been abandoned, even temporarily, by Mr. Deane, or Mr. Wright, had it shown much profit; and that of course must continue to be the practical test to apply at the present time. Apart from the "bonus" which, even if renewed, cannot do more than provide for a very limited quantity, the individual planter will be sure to ask. "If I make green, in place of black, tea, am I likely to get 1d, ½d, or even ¼d more per lb."? If, on the other hand, he finds that, while for his "black" tea he can get 6½d a lb., for the green he can at most secure 6d, no amount of persuasion is likely to change his course. We speak of the individual planter. The case is rather different in respect of large Companies or extensive proprietors. It may be very good policy for such to make a proportion of "green tea" even if it fetches a poor price comparatively, in order to relieve the pressure on the "black tea" market; and it is here where the Colony will look for a good lead from some of our mo e extensive and prosperous Tea Companies. In Travancore, too, a good deal of green tea ought to be made to supplement the shipments from Ceylon.

OUR PEARL FISHERIES: THE NEED OF SCIENTIFIC INVESTIGATION; AND OF A MARINE BIOLOGICAL STATION ON THE COAST OF CEYLON.

We direct attention to a long and thoughtful letter on the above subject from Mr. Oliver Collett, of Lower Dikoya, who is well-known to scientists, as well as his brother-planters, as an enthusiastic Naturalist of no mean attainments in the Department which he has made more peculiarly his own. We say so much in order that his letter may receive the attention it deserves from the local Government, and that it may especially come under the notice of His Excellency the Governor. Sir West Ridgeway is aware of the important scientific, as well as practical, work performed at the Marine Biological station at Port Erin in the Isle of Man. We had the pleasure of learning a good deal about this station in 1896, with a party of the British Association, guided, if we remember rightly, by Dr. Herdman, F.R.S, &c., Professor of Natural History in University College, Liverpool. We are not going into any details; but curiously enough we find that Professor Herdman, along with Professor R. W. Boyce, Mr. G. C. Bourne, and Professor C. S. Sherrington, was appointed in 1895, "to report on the Elucidation of the "Life Conditions of the Oyster under Normal "and Abnormal Environment, including in "the latter the effect of sewage matter and "pathogenic organisms." This investigation was carried on—and was the subject of successive Reports to the British Association all through 1896, 1897, and 1898. We may, therefore, conclude that Professor Herdman—who, from his connection with the Isle of Man, is, probably, well-known to Sir West Ridgeway—would be about the very best scientific authority to advise the Ceylon Government at this time on what should follow on Sir Wm. Twynam's History and Report, and whether a scientific investigation and the establishment of a Marine Biological Station near the site of our Pearl Fisheries is justified by the circumstances. Professor Herdman is too busy and important a man to come to Ceylon himself—except it were on a flying visit—and therefore our Government may be sure of an impartial opinion on the Papers placed before him.

We have no doubt there are some amongst the community who entertain strong doubts as to science being able to help us in this matter, and that our proposition, if carried out, would simply mean a waste of public money without any practical results; and they point to the mission of Mr. Holdsworth, F.Z.S., with its absolutely negative result, and still later to the investigation held by Mr. Edgar Thurston for the Madras Government. Now, it is quite true that Mr. Holdsworth's inability to help us, after five years' labour on our shores, was a bitter disappointment to Governor Sir Hercules Robinson and the whole community; and served to cast discredit on scientific aid from that day to this. But what does Sir Wm. Twynam show (as repeated by Mr. Collett) —that Mr. Holdsworth never saw a Pearl Fishery and never even during his five years as Ceylon Naturalist, had the opportunity of joining in an inspection of a bed of pearl-oysters on one of the banks off our shores. His five years were absolute blanks in these respects. Then let us think of scientific progress since 1865-1870! Why, Marine Biology was an unknown study thirty years ago. Sir Wm. Twynam, oo, is ignorant of the fact that, apart from Mr. Thurston's Monograph, there is much useful information to be gathered from other Colonies and countries bearing on Pearl Oysters. We have before us, as we write, for instance a Report by "W. Saville Kent, F.L.S., F.Z.S. Commissioner of Fisheries, Queensland" on "Oysters and Oyster Fisheries of Queensland" dated 30th June, 1891, which deals with pearl-shell fisheries and is illustrated by coloured plates of the various oysters and of some of their enemies, and with pictures of oyster banks, collections of spat, and plates illustrating the Embryology of the oyster. This Report we received from Dr. Haddon, of the Royal College of Science,

Dublin (since F.R.S., and Professor of Cambridge University) who wrote of "Saville-Kent" as an able man and that he was going on a special mission to North-West Australia, to study the Fisheries there. What further Reports Mr. Saville-Kent has published, we do not know; but enquiry ought to be made of both the Queensland and West Australian Governments as the owners of Pearl Shell as well as Pearl Fisheries. Then we have also dug out of our collections, a "Report upon the Pearl Fishery of the Gulf of California by Charles Townsend"—illustrated with photographs; and a "Report upon certain Investigations relating to the Planting of Oysters in Southern California, by Charles H. Gibbert," also with plates—both Reports being dated 1891 and addressed to the Washington authorities. Most probably the investigation was continued and further Reports ollowed, and perhaps, from California, Sir Wm. Twynam might learn of Pearl Oysters being artificially cultivated. But, in any case, we think Mr. Collett and ourselves have said enough to show that the Ceylon Government should take action—and it Professor Herdman were consulted, he could probably lay his hands on *all* the literature on the subject from America, Australia and India (and possibly referring to Chinese experiments with Pearl Oysters) before giving his opinion as to what could be done by Science in connection with the CEYLON PEARL FISHERIES.

OUR PEARL FISHERIES.

A PLEA FOR SCIENTIFIC INVESTIGATION.

Watawala, July 1.

DEAR SIR,—After reading your recent editorial remarks (see above) upon Sir William Twynam's Report on our Pearl Fisheries, and after a perusal of that valuable and elaborate account, the question is naturally forced upon one: Is it not passing strange that we still remain, after more than a hundred years of occupation of the island, in almost complete ignorance of the habits and instincts of the pearl-bearing mussels of the Gulf of Mannar?

The paramount importance of the question becomes evident when we remember that the total revenue derived from the Pearl Fisheries since 1796, amounts to no less than one million pounds sterling; and this in spite of the fact that some of the most promising of our fisheries were spoiled by the remarkable, and, so far altogether unaccounted for, disappearance of the "oysters," just as they were about to arrive at maturity.

The fact that the two oldest authorities upon our Pearl Fisheries (Sir W Twynam and Captain Dounan) hold diverse opinions regarding the probable cause or causes of these disappearances, shews how very much there is yet to be learned of the whole subject.

To the zoologist, it is at once clear that this and other vexed questions can only be set at rest by a thorough and systematic investigation into the Natural History and Life Conditions of the Pearl Oyster—more particularly in its early and post-larval stages.

At present we are without any reliable data or accurate information upon those points; and it is not impossible that it may be found that there are many agencies affecting the health and well-being of the pearl-oyster which may be brought, in a greater or less degree, beneath artificial control.

The few attempts at systematic investigation that have been made, appear to have been abandoned before any real knowledge of the subject had been gained. The labours of Dr. Kelaart (1857-9), which gave promise of the best results, were unfortunately brought to an end by his sudden death; and the employment of Mr. Holdsworth by Government in 1864 for a period of five years, appears to have led to no increase in our knowledge of the subject: for the simple reason that his energies were never properly applied. Sir W Twynam tells us that "he did not see a fishery, and did not witness an inspection of a bank with a bed of oysters on it, young or old." He also points out that "as the supposed term of a Pearl-oyster's existence is seven years, a Naturalist would not be able in five years to complete his researches and be in a position to lay anything definite before Government." And, finally, Sir William says: "No Naturalist has yet, so far as I am aware, reared Pearl-oysters in an aquarium, tank, reservoir, or enclosed portion of the sea from minute spat to maturity, ascertaining their exact condition at various stages of growth."

But while we in Ceylon have been content to remain in ignorance, the study of Marine Zoology in other parts of the world has during the last quarter of a century, made remarkable progress. The return home of the "Challenger" expedition in 1874 gave an impetus to the investigation of this important branch of natural science which has already led to valuable results. Marine Biological Stations have been established in different parts of Europe and America, which have greatly facilitated methods of research. The life-history of a number of our principal food-fishes has been worked out, and we are now familiar with many of the conditions of life in the sea which were formerly quite unknown.

For instance, it has been ascertained that marine life is, in many respects, almost as localized as that of the land; and that certain groups of plants and animals are *characteristic* of particular areas. We also now know that certain depths of the ocean contain organisms which are only to be met with in their own particular water strata—in accordance with what is known as the law of bathymetrical distribution.

Again, it has been discovered that almost all marine animals and plants are extremely sensitive to variations in the temperature, and in the specific gravity, and salinity, of the medium in which they live. These facts make it at once evident that all of these conditions must be observed and recorded before any attempt at artificial propagation, or cultivation, in any particular locality, can be expected to be successful.

No planter would attempt to grow tea in Jaffna, or coconuts in Nuwara Eliya; and, arguing by analogy, it is possible—nay, probable—that the marine life of our shores will be found to vary with every increase in the depth of the water, in precisely the same way that our land fauna and flora are modified by every change in the elevation of the land; climate in Ceylon being almost entirely determined by altitude.

Now, the *Mollusca* are—perhaps more than any other class of animals—greatly influenced by their environment. Take the land-shells for example. Their distribution is so local that an experienced collector can at once name the locality in which any particular species is likely to be found. In

Ceylon, it is almost always possible to judge the altitude at which any special kinds are to be sought for; and it cannot be doubted that similar conditions will be found to apply to our marine shells.

Thus, while the Tamblegam pearl-oyster (*Placuna placenta*) can easily be propagated and reared in the shallow waters near Trincomalee, as Dr. Kelaart amply shewed, the true oriental pearl-oyster (*Meleagrina fucata*) of the Gulf of Mannar, will only flourish at a depth of from 6 to 8 fathoms,—and this is perhaps the reason why all attempts at cultivation both here and off Southern India have hitherto failed.

It is possible that the oysters live far out at this depth in the Gulf of Mannar* in order to avoid the floods and sand storms from the northern rivers. The antipathy of oysters to sand was long since pointed out by the late Frank Buckland. The following allusion to it is to be found in the pages of "Punch" (1880):—

'Tis the voice of the oyster—I hear him complain,
" I *can't* live in this place; here's a sandstorm again!
I had settled at rest 'mid the rocks and the tiles,
They had made me a home, but this sand, how it riles,
It gets into my shell and the delicate fringe
That I use when I breathe; and I can't shut my hinge
When the grit lodges there; so the crabs come at will,
Since my poor mouth is open, they feed and they kill.
I've complained to Frank Buckland who quite understands
But he can't undertake to abolish the sands."

In 1892 a proposal was made by Lady Blake that a Marine Biological Station should be established in Jamaica as a memorial to Colombus. The idea was warmly supported by Professors Huxley and Ray Lankester, who suggested that the Government of Jamaica should initiate the scheme, and make the proposed Laboratory part of a Biological and Physical Survey of the Island. Special stress was laid upon the importance of having an observing station of this kind *in the tropics*, where the fauna and flora of the sea are so marvellously rich and varied.

The coasts of Ceylon are swarming with interesting forms of life, as we know from the writings of Hæckel and the brothers Sarasin; and while there are our Pearl-fisheries, of immense value, to be safe-guarded, there is also an important Chank fishery, which is undoubtedly capable of considerable development. An Experimental Station established at Negombo or Mannar for the investigation of the entire Natural History of the Gulf would almost certainly quickly repay the cost of its initiation and upkeep.

And the issues at stake are surely sufficiently large to justify the establishment of a small but first-class Marine Biological Station, similar to that which is doing such splendid work under Professor Herdman at Port Erin in the Isle of Man?—Yours truly.

OLIVER COLLETT.

"PARA" INVESTMENTS.—The American consul at Para is still trumpeting for the investment of American capital in the Amazon valley—in rubber estates, railways and all sorts of things. No one should be misled in this matter. If the American capitalist is inclined to take any such risk he should spend at least six months at Para and Manaos before deciding.—*Rio News*, May 22.

Correspondence.

To the Editor.

"GREEN TEAS IN CEYLON."

Stagbrook Estate, Peermaad, June 24.

(To the Editor, "Times of Ceylon.")

SIR,—I notice in your leading article on June 20th, you are dead against the production of green teas, and quote an extract from a letter of Mr. A E Wright to support your argument.

As against that view of the matter allow me to quote from Mr. F F Street, which appeared in the *Ceylon Observer* and "Times of Ceylon" on 21st January, 1890:—

"I consider there is a great future for Ceylon green teas of the quality and character lately produced by Mr. Deane, and I am decidedly of the opinion, that when these teas are made in sufficient quantity and become known that they will in time drive the China article out of consumption, in the same way as Indian and Ceylon black teas have and are still doing.

"These are the teas the Ceylon Planters' American Tea Company would do well to begin the campaign with in America, as the taste is already established there for these unfermented teas. Americans will then have an opportunity of judging of the *superior quality* of pure Ceylon greens as compared with faced China teas of the same class." Then he goes on to say:—

"As specimens of what green teas should be in cup, and infused leaf they are about as desirable as it is possible to make them."

So much for your argument that it will take us some time to learn how to suit the world's markets with green teas.

Again I quote from a letter published in the *Ceylon Observer*, of April 11th, 1890, (and I think "Times of Ceylon"?) from Messrs. Busk and Jevons, of New York:—

"We have shown these teas to several of the trade, and they invariably pronounce them finest to choicest Japans in the cup, and say they will have to be sold as such."

Many more such opinions could be quoted were I able to collect all the correspondence I had on the subject. Among others a letter from one of the largest houses in Japan, Messrs. Fraser Farley and Varnum of Yokohama in which they reported on my samples as superior in liquor and flavour to anything they could get, but not up to their Japan teas in appearance.

I now come to Mr. Wright's reply to your questions, and I must say it is a very unsatisfactory one, as it is misleading. It is true that green tea manufacture is, when a factory is making black and not green teas, a source of trouble—otherwise the one is as simple as the other. It is true also that rather more firewood is used, but even if Mr. Wright's figure of *double* is correct (which I beg leave to doubt) it is only an extra cent per lb. probably, and against this you have the entire saving of withering accommodation and spreading of leaf.

Your readers may take it from me that the cost of making green tea is no more than manufacturing black, and if green tea alone

is made, the outlay in withering accommodation is at once saved. It would be cheaper all round in manufacture I am certain, but the outturn is not more than 22 per cent., as against 25 per cent. of black.

If Mr. Wright would publish the invoices and account sales of all the teas he has sold, and been paid a bonus on (which in itself is a big profit in these days) it would be of great use, and if you will add here the enclosed cutting from the *American Grocer* it will speak for itself as I believe the teas referred to are from Mr. Wright? Mr. Rutherford and Mr. Mackenzie are level-headed men, and know what they are doing, and I believe that so soon as green teas are shipped in any quantity, a market will arise and prices be remunerative to many estates which are now averaging from 7d to 7½d or even less for Black Teas. Will you kindly insert at foot of this letter copy of my letter to the *Ceylon Observer*, and I think yourselves of 1st August, 1890, which I enclose describing the patent held by myself and Mr. Rae, as newcomers may unwittingly infringe that patent which not only applies to the "machine" but to the process of applying steam to green tea leaf.—Yours, &c.,

H. DRUMMOND DEANE.

(*Enclosure referred to.*)

CEYLON GREEN TEAS.—Thus the *Canadian Grocer*:—"Yes green Ceylon teas are a great factor on the Canadian and American markets at present, and are going to grow very rapidly," said P C Larkin, of The 'Salada' Tea Co. "We had shipments on the ss. "Maria," ss. "Beatrice" and ss. 'Clan MacLean,' all arriving within in ten days of each other, and they go out just about as fast as they come in. We had four repeat orders by mail in one day; that is, four orders without any solicitation came in direct on post-cards or letters. These remember, are 'repeats,' showing that the goods 'are going,' and that they please the public. We notice lots of others now taking up Ceylon greens, but there are Ceylon greens and Ceylon greens. In the course of a couple of years, they will have the same position in the green tea trade that Ceylon blacks have today in the black tea trade. To be sure, they cost a little more than Japan teas, but they give the dealer better profit, and, as they are much stronger than Japan teas, they go further and are, therefore, just as cheap to use, besides being of very much finer flavour and strictly without coloring."

GREEN TEAS: PATENT PREPARATION OF, IN CEYLON.

To the Editor Ceylon *Observer*,

DEAR SIR,—Some particulars of our invention which renders the manufacture of true green teas, simple and inexpensive, may b of use to your readers. We have, as you are aware, patented the method as well as the machine in Ceylon, and hope shortly to do so in India. Our patent covers—(1) A method of rendering tea leaf pliable for purposes of rolling or twisting without resort to the process known as withering. (2) A machine for carrying out this method on a scale large enough to suit the largest factories. Green teas may be divided into two classes—Oolongs or Semi-green teas, which are partially fermented, and true green teas, which are wholly unfermented. These teas are the most popular class of tea in use in North America as shown by the fact reported to the inventors by Mr. F. Street, the local tea expert, that, out of a total export of 51,000,000 lb. of China tea to the United States last season up to the middle of November, only a very little over 1,000,000 lb. of tea corresponding to the ordinary Ceylon black leaf was imported, while of Oolongs there were imported 14,000,000 lb. and of the unfermented class, which are the true green teas, no less than 32,000,000 lb.

In view of the desire in Ceylon to introduce teas of this island into the American market it is thus shown to be highly desirable that teas should be manufactured of the unfermented class, and that a method and apparatus for insuring the manufacture thereof should be perfected.

Oolongs consist of tea leaves, withered either artificially or naturally, by hot air or on hot plates, sufficient to enable them to be rolled, when they are straightway fired.

The result of this process is that the effect called by some fermentation and by others oxidization is partically produced, and this effect prevents the leaves from being uniform in colour and causes them to vary from an olive green to a light brown.

True green teas are made only of leaf which has never been fermented or oxidized and, when infused, should show a uniform yellowish green colour which could never be obtained had either oxidization or fermentation taken place. The production of these teas has hitherto been found impracticable in Ceylon, because leaf could not be rendered sufficiently soft or pliable to be rolled or twisted unless by its being withered either naturally or artificially by hot air or hot plates, which withering is in itself a degree of fermentation or oxidization.

It was therefore requisitive to find a method of obtaining pliability necessary for the rolling or twisting process by other means which would prevent all fermentation or oxidizations. The inventors claim to have discovered after long experiment, and to have been the first in Ceylon to practise their discovery of a method by which tea leaf is rendered sufficiently pliable for rolling by a method heretofore entirely novel in Ceylon, which process not only produces pliability but absolutely checks all fermentation or oxidization. Full particulars of the machine can be obtained from Messrs. Brown Rae & Co., our Agents at Hatton, and, with each machine, instructions necessary for its use will be issued.—Yours faithfully, (Signed) H. D. DEANE.

August 1st 1890.

FURTHER NOTES FROM MR. DRUMMOND DEANE.

Travancore, July 9.

DEAR SIR,—In *re* your leading article of 29th June, anent manufacture of "green teas," you say: —"It is quite evident that it would not have been abandoned, even temporarily, by Mr. Deane or Mr. Wright, had it shown much profit." The reason, I abandoned it was twofold:—

1. I had at that time (10 years ago) a contract with a well-known Queensland firm to give them as much "pekoe" as I could make at 9d per pound sterling f.o b. in Colombo. My bl ck teas, by *this contract*, were then averaging about *10d per pound*. It was impossible to make only the "finer" and "common" grades into "greens", and though the average I was then getting, of nearly 9d nett, per pound on green teas, was satisfactory, there was a drawback.

No. 2 (which would not affect a Company, but seriously affected the private producer) viz. whereas by selling pekoes in Queensland, I got cash on the nail with the Bill of Lading, and by

selling in London I would (10 years ago, remember) draw (free of charge) up to 10d per pound under my Letter of Credit against Bill of Lading.

By shipping green teas, then quite a new industry, I could draw nothing on my American friends; but all teas were sold at my risk, and account sales and their result remitted in due course which meant at least three months. What present average prices for "greens" may be in America, I cannot say?

Mr. A. E. Wright could to a certain extent solve that problem, "an' he would" indeed. I think it only due to the "Thirty Committee" who have paid him a handsome bonus, that they should ask him for his invoices for publication, and if the prices are better than many sceptics think, it is all the more reason he should continue to enjoy his bonus as the fruit of his pioneering, but *if* the prices are very poor, though deplorable, it does not at all follow that others may not obtain better ones. Indeed if he practises the *exact* method of sorting as published by him in his memo of manufacture to the "Thirty Committee," I feel sure better results could be obtained. Again, be it noted, it is impossible to make green teas and black teas together, without sacrificing the care needed in the manufacture of each class. I have yesterday written to your contemporary, the "Times of Ceylon", fully, perhaps too fully, on the question of green tea manufacture, and asked him to pass it over to you in case you are prepared to give up so much space in your paper. The most important point in *that* letter, and one which I hope, Sir, you will use your influence to bring about, is; that the "Thirty Commmittee" should not blindly hand over ten cents per pound on every invoice of green tea *shipped*, but should appoint a paid green tea expert) I know of none better than Mr F. Street) to sample one package of each grade of each invoice on which royalty is paid. I should not, by this, mean in any way, that no lower grade teas were to get the royalty, far from it. But I most strongly hold the opinion, that, until more is known of the method of making "green teas", much harm may be done by the shipment of an article, fondly imagined by its exporter to be a true "green tea," and yet something entirely different. To a certain extent this view is borne out by "J. B.'s" letter to the "Times of Ceylon" of 2nd July, recommending Messrs. Davidson's "withering machine" for the manufacture of green tea; also their roller. Now the latter suggestion is quite sound and I have, some days before, written Messrs. Davidson on the subject giving them two suggestions, which, if they carry out, will probably make their roller the best green tea roller in the market, viz. :—1. A movable screw weight that can be clipped to the sides of the machine, and removed at will, for pressing the steamed juice (or water and juice) out of the roller before *commencing* the roll. 2. Having holes drilled at bottom of roller to take away the said water and juice rapidly. But of his first suggestion to use their "withering machine" he would by so doing completely prevent the making of "green tea',', the very essence of the manufacture of which is that there must be no oxidisation or fermentation of the leaf. If therefore, our friend "J. B.'s" advice were followed, the result would be an "'Oolong'' and not a *green tea*.

I am open to correction on the following point at the moment, but am certain it was the case years ago, that ordinary "Oolongs" were not in it with pure "greens;" in fact my opinion is that, as a rule, "greens" that by accident had got more or less oxidized or fermented were shipped as "Oolongs."

The Formosa Oolong is quite a different article, but I have never heard of their being made successfully out of "Formosa", and plenty of people have tried to my knowledge with the best information before them, which point to soil and climate being the chief factor as regards their flavour. Apologizing for the length of this yarn.—I am, sir, yours faithfully,

H. DRUMMOND DEANE.

HOW TO MAKE GOOD GREEN TEAS.

A VALUABLE LETTER OF ADVICE.

Dear Sir,—I am afraid I am taking up too much of your space; but, after reading your report of Mr. Rutherford's views on the green-tea question, would ask your indulgence once more, to put the following opinions before those who are starting green-tea manufacture. If these teas are to be a success from the first—and there is no reason why this should not be the case with care—let me beg of those commencing to be in no frantic hurry to start off with large breaks of tea before they have thoroughly mastered the details of manufacture. Like all new industries, there is a certain unwritten law that can only be learnt by experience, no matter how clear the rules for manufacture are, as explained by myself. Mr. Wright or other pioneers; and it is probable that there will be found several petty obstacles to be overcome. What suits one set of machinery will be slightly different with another, and so on. What I would suggest, at any rate for a month, s that not more than one roll of green-tea shonlid be made a day in each factory new to the work. This, though giving a little trouble in washing the roller out and cleaning the firing machine trays, can easily be done "if insisted on" in any reasonably well-equipped factory. If leaf was brought in, say, at 8 a.m. for a roll, it could be finished before noon and put away With these small lots of tea every two or three days, I would suggest careful sorting, and the proportions being taken and samples sent to Mr. F F Street or any other "green-tea" expert, for report as to liquor and make. By the end of a month the manufacturer will know exactly what is wanted, and what he can do with the machinery at his disposal. By several men starting on these lines Ceylon green teas will be all of a class, and will command attention in America; otherwise, if all the first experiments are made in large quantities and shipped, the result will be disastrous to all concerned, and a bad name earned to start with. The following hints may prove of service:—

Plucking may be *coarser* without detriment, provided "hard," "bhanji" is strictly eliminated from the basket; *whole leaf* teas *must be aimed at*, and all fannings eliminated and kept separate; a good "broken pekoe" grade would be a *bad*, almost unsaleable green-tea; the small strong fannings from broken pekoes and pekoes can be kept separate and shipped as "Hyson" fannings; the coarser fannings as "Twankay." These teas are made into cakes or brick-teas as they are called. Now, in steaming, do not oversteam, or you will get a pulp; nor understeam, or your leaf will break in the roll; in rolling the less

weight used the better; but, before the machine is started, there is no objection to putting down the weight to get rid of steam water.

For every sorting a small lot of little round globules often occur. Keep these, and when sufficient, glaze them and class them as "gunpowder." With leaf coming in the evening, it can, after the first passage through the dryer, be left until morning to be rolled and finished off. It is (except in very wet cold weather) dangerous to keep leaf unsteamed through the night, as a small percentage of withered leaves spoils the appearance of your infused leaves in the cup, and gives a distinctly different taste to the tea, of what, I believe, is called the "Oolong" flavor.

In packing your finest teas I should use 3/8 in. boards of Cryptomeria Japonica, and this thickness is sufficient for 60 lb. and under, if matted or sewn in Hessian of a cheap variety. The cost is only fractional over the cost of half-inch packages, and the hoop-iron and hooping nails, both of which are saved in the *matted* package. Neatness of marking is advisable and two to three oz. over the nett lb. should be put in each package.

If "Momi" wood chests are used, use nothing under half an inch. All Japan teas, however, go in 3/8 in. Cryptomeria wood. I would suggest that if the Planters' Association give the present bonus, that they should only do so on teas *passed by Mr. Street* or any expert in Colombo, as sound good teas. If this is not done, a lot of rubbish will shortly find its way to America and do more harm than good. At present there is nothing to prevent a man sending away any rubbish he likes and claiming the ten cents. I consider this of vital importance, and urge the immediate attention of the "Thirty Committee" to this point.

I also hope the "Thirty Committee" will ask Mr. Wright to give them for publication invoices of all the teas they have paid him a bonus on. It will be interesting to follow the prices and the proportions of the grades in each invoice.—Yours, &c.,

H. DRUMMOND DEANE.

Peermaad, July 7.

P.S.—The teamaker at the Kellie Group factory was with me through all my experiments (Mr. H Patterson). I am glad he has a good situation. If his services could be spared to one or two of the larger concerns starting green tea manufacture, he would probably be of great use in helping to avoid mistakes.

THE TEA INDUSTRY:

HOW TO SECURE THE 8d. AVERAGE AGAIN.

Sir,—Take a

200 acre estate giving 500 lb. per acre=100,000 @ 6½d	£2,708
180 acre, (*i.e.*, =200 less 10 per cent) giving 500 lb. per acre=90,000 @ 8d...	£3,000
His gain on a year's working is =	£292
Deduct cost of simply weeding the 20 acres out of plucking at 1/ = (75 cts) = ...	£1
	£291

If therefore, we can, by reducing our output by 10 per cent, bring prices back to an 8d average, it will be clearly good policy to reduce our acreage, but, will men do it? No, they will not, unless a bonus is paid them out of the Cess, sufficient to cover cost of weeding the acreage out of plucking. There must be some inducement?—Yours truly,

OLD PLANTER.

THE POSITION OF THE TEA INDUSTRY.

London, June 20.

Dear Sir,—The speech of Mr. Rutherford at the meeting of the Ceylon Association last week, following on the very interesting and valuable circular of Messrs. Gow, Wilson & Stanton, will furnish reflection to everyone interested in the tea growing industry of Ceylon and India.

Rapid as has been the increase in consumption of British-grown teas of late years, production has now far out-stripped it. The balance on hand from last year was enormous, and so far this year the shipments to all countries from Ceylon are far ahead of last year. It is too soon to estimate the Indian outcome, but there is no reason to suppose it will be under that of 1899.

The market is now getting the benefit of the crops from the enormous areas planted in 1896, 1897, 1898, the full effects of which, however, are still to come. So far as we know, a comparatively small area of new land has been opened since 1898; but in Ceylon manuring is now helping to swell the output, and to complete the demoralization of prices already injuriously affected by extensions of area.

The rapacity of London dealers has often, and with reason, been blamed as the cause of the gradual yearly fall in prices—a fall that went on inexorably whether supply exceeded demand or fell short of it:—

In 1890 the production of Ceylon and Indian teas was	..	152 millions.
Consumption in all countries	..	150½ ,,
In 1898 Production was	...	273 ,,
Consumption in all countries	...	278 ,,

Yet the average price in 1890 was 10½d and in 1898, 8d.

The price has fallen regularly about ¼d a year, whether production exceeded consumption or not.

AVERAGE PRICE, CEYLON AND INDIAN TEAS.

1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.
10½	10⅓	9¾	9¼	9	8¾	8½	8½	8

Seeing that during those nine years our teas had practically secured the whole British trade, while exports to other countries rose from 16 to 62 millions, we might have expected prices to have been maintained, instead of which, however, they fell 25 per cent.

The public did not reap a corresponding advantage, for packet teas remained at prices fixed ten years ago—for instance 1s, 1s 4d, and 1s 7d. Wholesale prices are now much lower than in 1898, the fall being now in pence instead of farthings; yet except for alteration in duty, the public pays the same price.

The recent fall needs no rapacity to explain it. It is due entirely to over-production, and the question is, How can Tea Garden owners apply such a remedy as will speedily give them a living wage, or interest on their investments?

Two or three methods suggest themselves—the first and most certain and immediate in its effects would be that all tea grown, say in July, should be either destroyed or held off the

London market. It might be shipped to Russia and sold there for whatever it would fetch, but for the danger that it might be sent from there to London. It is beyond doubt that were 10 or 12 millions diverted in some such way from this market and a shortness of supply thus created, more money would be got for the remainder of the crop than for the whole at present prices.

As a case in point, taking the last series of ten years — the year which gave the shortest crop of Australian wool, had the largest return in total price. Again coffee has risen 30 per cent on what is a still unconfirmed short estimate of the Brazil crop.

A second method, equally sure, though slower in its action, would be that planters should aim at quality rather than quantity, and pluck 10 per cent less.

A third method is to make the teas the American public drink. This I have constantly urged for five years, but, of course, while tea planting was profitable, there was no chance of an audience. *No*, with true British stubborn wrong-headedness, we said :— "Let the American tea drinker abandon his coffee and green teas and pay his devotion to the Ceylon article, just as we choose to make it." The American ear is not so easily tickled. Our black tea has displaced black Chinas in America to a considerable extent, but we have made no progress against green teas, which are used to three times the quantity black teas are. Had we been sensible enough to begin to make teas for America five years ago, our present difficulties would not have arisen. But then the extension of planting would have gone on, and we must in the end have out-paced consumption. Our blind persistence in trying to make converts, has perhaps happily allowed the evils of over-production to be earlier apparent to us.

To get speedy relief in this way, Ceylon might make during the next few months, say three to four million lb. of green teas—*entirely uncoloured artificially* (Such teas have already been made from sea-level up to nearly 5,000 ft.) and ship them to America. If carefully made, I believe, these teas would sell at a price quite as good as we are now getting for black teas. But even were there a loss on them, the gain by taking that quantity off the market here would amply compensate.

India could make the same quantity of coloured greens, and dispose of them in a similar way. There are such a number of varieties of unfermented or under-fermented teas ranging from pure Japans to Formosas and Oolongs used in America, that the teas would sell, even if not true to any particular type.

But shippers would require to have Agents to protect their interests, unless prepared to sell them at ANY PRICE, as the few large importers would do all they can to have the goods "smashed" out at auction. And we cannot blame them :— they have costly establishments in China, Formosa and Japan. They have had the trade in their hands for many years, and are not likely tamely to submit to have it snatched from them. As Mr. Rutherford pointed out, it would pay Ceylon and India to get a quantity off this market, even if growers of black tea made good the loss on green teas.

If either of the first two methods is adopted to help us *speedily*, I believe the green tea business will increase so rapidly in America as to prevent our again falling into the present slough. What it wants now is *careful nursing and direction*. The chief difficulty just at present is to get the tea; but arrangements now being made will, I hope, overcome this, without at the same time flooding our young market too soon with crude or faulty teas, which might upset the good opinion many judges in America have formed of Ceylon greens.

Then, as Messrs. Gow, Wilson and Stanton suggest, the South American markets might be tried. Russia too is making remarkable progress with our teas. One gentleman asked at the meeting what Green teas were worth in America. Well, like Ceylon, the prices quoted in papers just to hand, ranged from 5d. to 1s. 1d. One report I see is to the effect that Japans are stronger and rising in price, while Ceylons and Indians are weaker on reports from London. There is more sale for Japans over 8d. than for Ceylons over that price.

All we want is *unanimity*, which should easily be attained in the community of educated men, when faced by what is, if not *ruin* to all, at least *that* to many, and pinched rations to the rest. The only question is, Has the true cause of this "lash of necessity" yet been recognised? What can it be but over-production? Shorten the supply and instead of a ring of buyers, organized to dole out to the grower only as much as will keep him alive, you would find them as Americans would say, "tumbling over one another" to get the stuff.

In a case before the Courts today, I see that peaches costing ½d. each at the Cape, were sold here at 65s a dozen. Why? *Because scarce* at a certain season of the year.

These suggestions are to meet the need for *immediate relief*. For the future, say beginning early next year, what is needed is much more extensive pruning before the great rush of leaf, which comes with the April rains. Teas made in April and May lack quality, and their quantity is so great that they smash the price every year in May and June. A leading distributor here said to me quite recently :—"We have no sympathy with the Ceylon planter now. Here you are pouring in millions of pounds of poor pointless teas, which, if we buy, we must get into consumption within two months, as after that time they are worthless, except to make bulk in blends. They have no keeping quality."

WM. MACKENZIE.

OUR TEA INDUSTRY: HOW AN "OUTSIDER" VIEWS IT.

The Jungle, July 10.

DEAR SIR,—I am not a tea planter, but take a general interest in our staple interest, and have been reading the recent utterances of various authorities on Over-production and Reduction of Prices It has struck me that one branch of the subject has not received any elucidation, viz, the additional income from the additional quantity produced, and the reduction in cost of production in dealing with larger quantities. Do not these savings act as offsets to

the reduction in price. Thus an increase in production from 350 to 500 lb. per acre would stand as follows :—

	d		c		
350 @	10	=	70 @ 1/2	=	R255*
500 ,,	8	=	50 ,, 1/4	=	250
			Loss per acre	=	R5

or 1 cent a lb.—to be covered by reduced cost of production, less cost of manure and other charges attendant on dealing with the increase in bulk, *i.e.*, transport, chests, etc.

I cannot follow the question further, but would be glad to see it worked out and ventilated.—Yours truly,

IGNORAMUS.

*["Ignoramus" is true to his name, seeing he works out 350 @ 70 c to equal R255 in place of R245—where is the loss? There is actually a gain of R5 per acre so strengthening his argument; but 50 cents is too high an average—many do not get 35 cents —Ed. *T.A.*]

OUR TEA INDUSTRY—THE QUESTION OF THE DAY.

Upcountry, July 10th.

Dear Sir,—It is highly interesting to me to read all the different schemes which are appearing in our local papers with regard to the best way to face the burning question of our planting day.

First, let us take Mr. Rutherford's plan of making 25 per cent. of an output into green teas and try if we can't ram, cram, and jam it down the throats of the Americans and Canadians.

If Mr. Rutherford is sure we can produce as good an article, and place it in those markets as cheaply as they are now shipped from Japan and China across the Pacific, by all means let independent planters and Companies shew us the way as you wisely suggest. My impression is that this tea is landed and sold much cheaper than we can do it and that practically we shall be trying to capture these great tea-drinking countries to little or no purpose or at any rate it will take a long time to get the wedge in.

Those in the trade have always held, I believe, that the nearer we get to China and Japan in prices the better our Indian and Ceylon Teas will take everywhere for the simple reason they are better worth the money, and the result will be, I think, that while the ousting process goes on our prices will harden. It is just possible we may manage to ship in the future 10 per cent. at least of our teas as greens, but it appears to me that it would pay us better than going on spending the cess money in pushing and advertising our products in places where they simply don't want black teas, if the Planters' Association would pay our planters a bounty on all greens we ship and at the same time promise a yearly bonus on every acre now in bearing they discontinue plucking and pruning and allow to rest, sufficient to defray the cost of weeding such resting acreage. It would do our estates no harm to let 10 per cent of the plucking area grow up for a year or two taking another portion of the estate in due course, if kept free of weeds. By these means, I have no doubt our total export will be reduced quite 25 per cent, thus arresting, in a great measure, overproduction which is pulling us down to close on non-paying point. Manuring and increasing the yield would find their own level, and, so long as the former is not increased and our plucking acreage is reduced, we need not fear; and further extensions, too, will, I think, be reduced to a mere nothing, once people see we are compelled to *put on the breaks.*

By a judicious planting of shade trees in suitable localities, thereby reducing cost of weeding, I think a considerable saving can be effected, for practically there will be no weeds ; at any rate. This work can easily be done by the pluckers, they being made to weed each square before plucking. Doing this work in this way three or four times per mensem, there should be little weeding to do. Ramasamy, who has had a grand innings the last decade or two, should be made to give up his high-flown ideas *re* advances, which he has little intention of paying, and head kanganis' pay and kanganis' names should be *stoutly refused.* A long pull and a strong one, and a pull all together and we may get the ship off the rocks; but, something, both here and in India, must be done or she'll bump herself to pieces. Railway freight should be reduced on our best paying lines at once, on all up and down estate traffic.

Direct supply of our teas should be encouraged by every possible means and thereby get rid of that monster, the middleman.—Yours faithfully,

SYN AR Y HUND.

FODDER, GRASS AND AUSTRALIAN TREES.

British and Colonial Seed Warehouse,

Swanston Street, Melbourne, 22nd June, 1900.

Dear Sir,—We thank you for copy of your valuable paper of 16th May, duly to hand and note remarks *re* "Maram Grass," We are at a loss to understand how it could be described as "A splendid fodder both for fattening and milk production," it being worthless for such purposes. This view is borne out by reference to the following authorities :—Baron F Von Mueller, the well-known scientist and for many years Government Botanist for Victoria, in his work "Select extra-tropical Plants," page 337, he says, "like Psamma Baltica and Elymus arenarius, they can be used for paper material, for tying, and for mats. *They are not touched by grazing animals,*" London's Encyclopedia, page 57, describes its use for fixing sand against the action of winds and tides, adding :—"Mats are made of it, and it is used as thatch." Vilmorin Andrieux & Co. simply describe it as Reed grass, Seasand grass.

We think these statements fully justify our description which was based on local observation and render any further comment unnecessary.—We are, dear sir, faithfully yours,

LAW SOMNER & CO.

P.S.—By this mail we are sending you our catalogue thinking you may feel interested in the timber trees of Australia now being largely introduced into India and South Africa, see pages 98, 99 and 100.

L. S. & Co.

[The above letter refers to an extract given some time ago by a correspondent from a colonial journal praising "Maram Grass" for fodder purposes.—The catalogue sent us is a very full one and the list of the "Hardwood Timber Trees of Australia" is particularly attractive.—Ed. *T.A.*]

NEW LONDON CUSTOMS RULES: TEA TARING IN LONDON.

(*General Order 42, 1900 Customs House, May 28th 1900.*)

Tea Taring.—Regulations as to weighing with an added half-pound weight, increase in number of "Tarers" for averaging, and separate taring of bulked tea.

(1) The Board direct that, on and after the 1st June, 1900, in taring whether separately or for averaging purposes, any package of tea of which the gross landing weight was more than 28 lb. the weight of the empty package be ascertained as follows:—

When the scales have been carefully balanced, a half-pound weight is to be placed in, or attached to, the weight scale. The weight of the package must then be taken to the pound only, the weight scale preponderating according to the usual practice in taring. The half:pound weight placed in the scale is to be ignored in recording the tare.

(2) The Board further direct that, for average taring, the number of packages for "Tarers" prescribed by paragraph 61 of General Order, 127/1892, be increased as follows:—

When in a chop or bed, the number of packages of the same size and description of tea is

	20 or less	3 tares to be taken and
from	21 to 60	5 ,, ,, ,,
,,	61 ,, 120	7 ,, ,, ,,
,,	121 ,, 400	9 ,, ,, ,,
,,	401 ,, 700	11 ,, ,, ,,
,,	701 and upwards	13 ,, ,, ,,

Two or more beds in one chop may be tared together on the foregoing scale.

(3) Every package of tea bulked in the United Kingdom shall be separately tared.

General Order 102/1894, respecting taring of bulked teas, and the as yet suspended London Port Order 39/1899 are hereby cancelled.—By order of the Board, (Signed) John Courroux.

A NEW TEA DISEASE.

Mr. A. Brown, of the Glenfruen Estate, Devala, brought before the meeting of the Planters' Association in Ootacamund on the 10th instant, the correspondence that has passed between himself and the District authorities regarding the ravages of a new tea malady of a fungus character. It appeared in May of this year in a nursery, and destroyed no less than 75,000 seedlings. In 1898 and 1899 Mr. Brown's seedlings perished, as he supposed, at the time, from drought, but as he now suspects from this new disease. He addressed Dr. Watt on the subject last year and forwarded samples of the diseased seedlings but these were not received in a condition to admit of examination when Dr. Watt returned to Calcutta from Burma, and he therefore was not able to accurately determine the disease. Dr. Watt sent some of the seeds to England, and received a reply in May last, from which he gathered that the seedlings were affected by eelworms. This malady, he said, was of a very alarming nature. For some years past it had been rapidly extending all over the world, and attacking every class of plant. Dr. Watt further informed Mr. Brown that his were the first samples of tea affected by the disease that he had received, remarked that he had met with what appeared to be eelworms in coffee during his late visit to the Wynaad, and concluded by asking that fresh samples of the diseased plants might be sent, promising to offer suggestions as to treatment. In an earlier communication on this subject, Dr. Watt recommended washing the plots affected thoroughly and repeatedly with Bordeaux mixture, which consists of 50 gallons of water, 6lbs. of copper sulphate and 4 lbs. of unslaked lime.—*Madras Mail*, July 12.

AGRICULTURE IN THE WEST AND EAST.

We cannot forego the pleasure of publishing the following gratifying letter received by a recent mail from Dr. Morris, C.M.G., Imperial Commissioner for Agriculture in the West Indies:—

Imperial Department of Agriculture for the West Indies, Barbados, 30th May, 1900.

I am in receipt of your letter of the 20th April, and I am greatly concerned to find that you have not received the publications of this Department. Your name was amongst the first to whom I had arranged to forward every thing published at this office. I cannot understand how it is that our sendings have gone wrong.

I have pleasure in forwarding, by this mail, copies, of the "West Indian Bulletin" Nos. I and II, and a Pamphlet issued on "Moth Borer in Sugar Cane." The third Number of the "Bulletin" will be out in the course of another week and a copy will be sent to you in regular course. I assure you that I shall be happy at all times to be of service to you in this part of the world, as I entertain the warmest appreciation of your kindness in regard to everything connected with the *Ceylon Observer*, and your numerous publications on planting subjects in the tropics.—With very kind wishes. Believe me, Very sincerely yours, D. Morris.

IMPROVEMENT IN TEA MANUFACTURE.

It is very satisfactory to know that "perfection" has, by no means, been attained, in respect of the various processes observed, or in the final result as regards the preparation of the tea leaf for market and consumption. There is plenty of room in several directions for the exercise of the inventive faculties, of our planters, engineers, etc. And it is especially interesting to note that the latest alleged improvement—and patent machine—comes from a gentleman who bears an historic name in the mercantile and pioneering annals of Ceylon. Mr. John Armitage, in the "forties" and "fifties," was one of the most prominently enterprising and successful of our colonists: he had brought from South America a great deal of experience to turn to account here; and he rapidly became a leader among our merchants. The present inventor of an improvement in tea manufacture is his son, Mr. H. T. Armitage, and elsewhere we take from our evening contemporary, an interesting account of the process. We shall be glad to learn what other practical planters think of it. Already it has secured a special measure of success; and we heartily trust it will do for many more estates, what it has realised for Dunbar in raising the average value of its teas, some nine cents per lb.

OVER PRODUCTION OF TEAS.

To the Editor of the *Home and Colonial Mail.*

Sir,—It would perhaps be unnecessary to reply to Mr. Hughes' letter in your last issue, were it not that he appears—unintentionally, no doubt—to have drawn wrong inferences from my letter, in order to air his hobby of manuring.

I pointed out that the average fall of one farthing per pound per annum for ten years was due to the rapacity of dealers rather than to over-production, but that over-production was clearly the cause of the recent much more rapid fall. Mr. Hughes says the steady fall is probably due to a decline in quality. But the fall has been in both Indian and Ceylon teas, practically the only teas consumed. The prices of 1s, 1s 4d, and 1s 7d, seem fixed to consumers. If rapacity has nothing to do with this steady fall, where do dealers buy the finer and dearer teas to blend with the teas of Ceylon and India so as to justify the same price to consumers as was charged ten years ago, when teas cost them 3d. more?

I did not say teas made in July were inferior—on the contrary we know they are about our best teas. I did say the most certain method of improving the price was to keep a month's crop off the London market. This merely to emphasize the fact of over-production.

He who would advise general manuring under present circumstances, with the certain result of further over-production, would deserve to rank with those who refuse help to drowning men, unless such help is paid for. I quite agree with Mr. Hughes when he says "there is plenty of scope for a higher individual price." But where is the foolish Quixotic dealer who would pay this higher price while over-production is rampant. Again, a general, not individual, higher price is necessary to sustain the industry.—Yours faithfully, Wm. Mackenzie.

July 4, 1900.

TEA SAMPLING.

TO THE EDITOR OF THE HOME AND COLONIAL MAIL.

Sir,—I venture to draw your attention to a matter which in my judgment merits the strongest condemnation, namely, the manner in which tea is sampled at present in many of the dock warehouses. A dealer buys a break of, say, 100 chests in sale, on a sample which possibly weighs three ounces. Immediately after sale he sends to the warehouse for, say, eight pounds from eight of the chests; and the supposition has always been that the dock company opened eight chests and furnished him with a pound from each, charging 4d per chest for the service rendered. But, can it be believed that in numbers of tea warehouse two or three pounds are taken from one chest—possibly from a chest already open, so that the benefit to the buyer of getting eight separate samples from as many different chests, not previously sampled, to enable him to check his purchase, is entirely lost. But he is nevertheless charged 4d. per package for opening eight chests, and at the same time deprived of the power to ascertain if the bulk is equal to sample or whether the break is regular in quality or not; in fact, it is quite possible for the dock company to scamp the bulking of the tea, and escape detection afterwards till the buyers chance of establishing a claim for irregularity has lapsed under the public sale conditions. Surely this is a matter which the Brokers' Association should look into if the honourable traditions of the tea trade are still to be maintained.—I am, &c.,

D. F. Shillington.

THREE NEW SPECIES OF EUCALYPTUS.

By R. T. Baker, F.L.S., Curator, Technological Museum, Sydney.

Eucalyptus Oreades, sp.nov. A "Mountain Ash."—A tall tree with a smooth whitish bark down to the ground, or sometimes leaving a lighter rough bark 6—8 feet from the ground.

E. Maculosa, "Spotted Gum."—A tree rarely exceeding 60 feet in height, usually from 20—40 feet (W.B.). Bark smooth to the ground.

Eucalyptus Patentinervis, "Bastard Mahogany."—A medium-sized tree as far as seen, with a stringy bark similar to that of *E. resinifera* Sm

On Two New Species of Casuarina.—By R T Baker, F.L.S., Curator, Technological Museum, Sydney. From the proceedings of the Linnean Society of New South Wales, 1899, Part 4, October 25th. Casuarina Cambagei, sp. nov. —"Belah."—A tree attaining a height of from 70 to 100 feet, diœcious, glabrous; branchlets glaucous or dark green in the slender form, ascending, internodes varying in length up to half an inch; not prominently angled. Casuarina Luehmanni, sp. nov.—"Bull Oak."—A fair-sized tree, attaining a height of 70 to 80 feet, or rarely 100 feet, and a diameter of from 1 to 1½ feet, rarely 2 feet. Bark furrowed, brittle, and easily removed. Branchlets robust, light coloured or glaucous, under a line (¾) in diameter, about the same thickness as in *C. glauca*, Sieb. the internodes ribbed, 6 lines long, glaucous, the nodes yellow, sheath-teeth brown or black, short, acute, 9 to 12 in the thorl, mostly 11.

BRAZIL COFFEE NOTES.

Telegrams from abroad state an accord has been reached between Brazil and Italy in regard to the duties on Brazilian coffee. It is also said that France has consented to knock off 20 francs, which in our opinion is not sufficient.

The *Commercio de S. Paulo* of the 23th ult., says that recent torrential rains have greatly prejudiced the coffee crop in the Ribeirão Preto district. At Mocóca and other points the rains have knocked off much fruit, the damage being estimated at one-third of the crop.—*Rio News* June 5.

A São Paulo telegram of the 10th inst., says that in three Italian steamers 3,000 Italian laborers had left that state for Italy. This at the beginning of the coffee picking season is a bad sign. The planters cannot be managing well if laborers are leaving the country just at the time when they are most wanted.—*Rio News.*

America to Grow Green Teas!—Just as we in Ceylon are making every effort to send green teas to the American continents, lo and behold! the black-tea-producing country in South Carolina intends to take up the pursuit. We quote as follows from the *Planter* of June 7th, but let no local planter be alarmed, in spite of the apparent success of the Carolina plantation:—

Dr. Charles U. Shepard, Special Agent in charge tea culture investigations, writes to us from "Pinehurst," Summerville, South Carolina:—"The experimental irrigation which I am now introducing into my tea gardens should materially increase the leaf production. According to my best results, it would seem possible to produce decidedly more than 500 lb. of dry tea per annum per acre. Can you favour me by sending any printed data as to the best methods followed in India in the manufacture of *Green* tea? . . . As yet I believe no good results have followed the attempts to apply mechanical processes to this manufacture."

DIMBULA VALLEY (CEYLON) TEA COMPANY, LD.

ANNUAL REPORT.

Directors' Report to be submitted to the Shareholders at the fourth annual ordinary general meeting to be held at the Cannon Street Hotel, on Monday, the 25th day of June, 1900, at 12 o'clock noon. The Directors beg to submit the General Balance Sheet and Profit and Loss Account for the year ending 31st March last. After bringing forward £802 12s 9d from last accounts and providing for general expenses, London office expenses, and £500 for depreciation, the net amount at credit of Profit and Loss Account is £18,894 5s 8d.

Dividends aggregating 6 per cent. less Income Tax have been paid for the 12 months on the Preference Shares amounting to ..	£3,440	2	0
An Interim dividend of 4 per cent, less Income Tax on the Ordinary Shares, has been paid, and amounted to	4,586	12	0
It is proposed to pay a final dividend of 6 per cent on the Ordinary shares making 10 per cent. for the year, and which will amount to	6,879	18	1
It is proposed to carry to a Reserve Fund	2,000	0	0
Thus leaving to be carried forward to next year a balance of ..	1,987	13	7
	18,894	5	8

The past season was a normal one in the Dimbula District, the yield from the Company's estates being at the rate of 512 lb. per acre from tea in bearing, or a total of 1,079,829 lb. against the previous year 930,281 lb.

The cost of cultivation and placing the crop on board ship in Colombo was 25·77 cents per lb. as against 29 cents for '98-'99 crop.

The total crop realised (including 110 cwt. coffee) £42,558 10s 7d or an average for the tea of 9·49d per lb., against £39,127 13s 4d or 10·09d per lb. the previous year. Exchange averaged 1/4 15/32 per rupee, against 1/4·29.

The freight, warehousing and selling in London, including Fire and Marine Insurance from the field to the prompt date. cost ·90 of a penny, and too much credit cannot be given to the Agents for their care and economical working.

The estates are as usual in a good state of cultivation, and the thanks of the Company are due to the Manager and his Staff for the ready and willing manner in which they have co-operated with your Board to this end.

To be in accordance with the usual custom of Tea Companies, and to facilitate the operations on the estates, the Directors consider it advisable that the Financial Year be closed on the 31st December annually, instead of 31st March as at present. They propose bringing this alteration into effect forthwith, making the present year one of nine months only.

During the year Mr. T C Owen was elected a Director in the place of the late Mr. C J Rowe.

Mr. W Forbes Laurie retires by rotation, but being eligible, offers himself for re-election.

Messrs. Singleton, Fabian & Co., the Auditors to the Company, retire, and being eligible, offer themselves for re-election.

JAMES SINCLAIR, Managing Director.

BERTRAM F. WHITE, Secretary.

14th June, 1900.

BOGAWANTALAWA DISTRICT TEA CO.

ANNUAL REPORT.

Report presented at the Third Ordinary Annual General meeting of the Company, held at the office of the Company on Wednesday, 27th June.

The Directors have the pleasure to submit the balance sheet and accounts of the Company for the year ending 31st March 1900, duly audited.

The yield of Tea largely exceeded the estimate and the cost of production has again been reduced, but the average price of the Tea sold in London compares unfavourably with that of the previous year, the market having been very dull for the last three months.

The Ceylon expenditure includes £300 13s 7d spent on planting 84 acres with Tea and felling and clearing a further 13 acres, as well as £420 13s 2d the cost of a new Turbine and of altering the watercourse in Elbedde.

The total yield was 1,209,451 lb. Tea plucked off 2,185 acres, of which 114 acres are only in partial bearing, being at the rate of 553 lb. per acre all round, costing free on board at Colombo 22·61 cents or 3·69d per lb. The gross average price of the 1,186,433 lb. sold in London was 7·98 per lb.

The crops for the current season are estimated at 1,121,000 lb. tea.

The gross average at which drafts were negociated was 1/4 5-16 per rupee against 1/4 5-32 and 1/3 9-19 in the two previous seasons.

The Directors desire to place on record their appreciation of the services of their Manager and his staff in Ceylon.

STATEMENT SHEWING RESULTS OF WORKING FOR THE THREE YEARS ENDING 31ST MARCH.

Season.	Acreage Plucked.	Total Tea Crop.	Yield per Acre.	Cost of Crop per lb. f.o.b., Colombo.	Gross average per lb. Tea sold in London.	Average rate of exchange per Rupee.	Dividends Preference.	Dividends Ordinary.
	Acres.	lb.	lb.	d.	d.			
1897-98	2,041	994,413	487	4·22	8 20	1/3 9-16	6	6
1898-99	2,081	1,031,782	495	4·12	8·71	1/4 5-32	6	7½
1899-00	2,185	1,209,451	553	3·69	7.98	1/4 5-16	6	7½

The Profit for the year amounts to ..	£15,241 14 0		
To which has to be added Interest ..	100 14 6		
And the Balance from last year of £1,061 14 7			
Less Income tax, 1898-99 ... 435 1 4			
	626 13 3		
		£15,969 1 9	
Interest on the Mortgage Debentures has been paid, *less* Income Tax ...	406 0 0		
Dividends on the per cent. Preference Shares for the 12 months were paid on the 11th October, 1899, and 2nd April, 1900, *less* Tax ..	5,394 0 0		
An Interim Dividend of 2½ per cent. on the Ordinary Shares was paid, *less* Tax, on the 10th January, 1900 ..	2,416 13 4		
Income Tax to April, 1900, has been paid ..	466 11 4		

It is proposed :—

To pay a final Dividend of 5 per cent. on the Ordinary Shares, making 7½ per cent. for the year, which will require *less* Tax ..	4,833 6 8	
To transfer to Reserve (increasing this account to £3,000) ...	1,500 0 0	
And to carry forward to next year the balance of ..	952 10 5	
		£15,969 1 9

The Director retiring on this occasion is Mr. Alfred Tabor who being eligible offers himself for re-election.

Mr. John Smith the Auditor also retires and offers himself for re-election.

ROBERTSON, BOIS & Co., Agents & Secretaries.

SCHEDULE OF THE COMPANY'S ESTATES.

Estate.	Tea, full bearing.	Tea, partial bearing.	Tea, not in bearing.	Forest.	Grass.	Chena and Patena.	Total.
Kirkoswald	756	—	22	*87	12	—	877
Bridwell	382	—	36	35	5	15	473
Elbedde	605	100	—	27	15	—	747
Bogawana	338	4	26	44	6	18	436
Total	2,081	104	84	193	38	33	2,533 acres

*About 13 acres felled and prepared for planting with Tea.

CEYLON ESTATES INVESTMENT ASSOCIATION, LIMITED.

ANNUAL REPORT.

The Directors beg to submit the Accounts for the year ending 31st March 1900. The crop harvested amounted to 296,673 lb or 59,521 lb in excess of the previous year. The average price obtained was, however, about ⅝d per lb lower.

The Balance at the credit of Profit and Loss Account, including £207 15s 11d brought forward from last year is	£1,879 10 8
which the Directors propose should be applied in payment of a Dividend at the rate of 5 per annum, free of Income Tax,	1,550 0 0
and that the balance of	£329 10 8

be carried forward to next year.

The Directors who retire at this time in conformity with the Articles of Association are Mr. Robert King and Rev. Peter Grant, D.D. They are eligible and offer themselves for re-election, and the Directors recommend the election of Mr. Gavin Whitelaw as Director. The Auditors, Messrs. Moores, Carson & Watson, C.A., also retire, but are eligible to be re-appointed.

ROBERT KING, Chairman; BROWN, FLEMING and MURRAY, Secretaries.

DUMONT COFFEE COMPANY, LIMITED.

ANNUAL REPORT.

Report to be presented at the Fourth Annual General meeting of the Dumont Coffee Company, Limited, to be held at Winchester House, Old Broad Street, London, E.C., on Friday, the 22nd day of June, 1900, at 12 noon.

The Directors submit the General Balance Sheet and Profit and Loss Accounts for the year ending 31st December, 1899. The profit for the year amounted to the sum of £41,751 4s 5d; carried forward from 1898, £2 325 8s 3d=£44,086 12s 8d. Interest at 5½ per cent per annum has been paid on the Debentures amounting to £21,989 0s 0d; interim dividend on the Preference Shares paid in July, 1898 (together with income tax thereon), brought forward in the balance sheet last year £15,000 00d =£36,989 0s 0d; leaving a balance proposed to be carried forward of £7,097 12s 8d. The coffee crop amounted to 93,301 cwt., against 41,476cwt, for the previous year. Of this, 31,687 cwt. were sold in London, and the remainder in Santos and New York. The gross average price realised for all the Coffee was equivalent to 29s 4½d, landed in London, taking the exchange at 7½d per milreis, which is the rate fixed by the auditors for the year's accounts. During the greater portion of the selling season, the coffee market was at a lower level than ever recorded during the last half-century, and for this reason, the average price obtained for the Company's crop was unfortunately extremely low. The spot price for good average Santos coffee for the five months, June to October, 1899, was 26s 10d per cwt., the rise in the coffee market not taking place until the end of 1899, and the beginning of 1900, by which time the greater portion of the Company's crop had been sold; the present price is about 38s 6d per cwt. As the Company's pulped coffee formed the greater portion of the earlier part of the crop, it obtained a lower average than the unpulped coffee, which did not come forward for sale until the latter part of the season. The Directors have satisfaction in recording that the large crop of 93,301 cwt. was well harvested in good time, which was due to the now completed railway system over the property, and to a well organised labour force under European management. The Shareholders will be glad to know that "Dumont" coffee has established a good name in European markets on account of its superior flavour as compared with Santos coffee generally, and now commands a better price than other Brazilian coffees on the London market. This the Directors consider attributable to the complete system of drying grounds and strong sheds with which the properties have been equipped, as well as to the careful work of the staff. Mr. G A Talbot visited the property in September last, in accordance with the desire of the Shareholders as expressed at the last annual general meeting. He was then able to go carefully into all details of expenditure with the Company's manager and staff, with the result that the Directors have been able to effect economies in working. The manager reports favourably on the condition of the coffee trees, both old and young, and estimates the current crop at 75,000 cwt., which at present prices would yield a considerably increased profit as compared with the year under review. The weather recently has been somewhat unfavourable, but cabling on the 31st May last, the manager reports:—"I have hope that 'Dumont' estimate may probably be obtained." There are now 10,918 acres in bearing, and 2,343 acres of young coffee, making a total of 13,261 acres planted. Major F B McCrea and Mr. C A Carlisle have, since the last meeting, ceased to be Directors of the Company, and Mr. Stratten Boulnois has been appointed to a seat on the board. Mr. H K Rutherford and Mr. G Talbot are the retiring Directors, and, being eligible, offer themselves for re-election

KELLIE (CEYLON) TEA PLANTATION COMPANY.

ANNUAL REPORT.

The following is the report of the directors submitted at the meeting held on the 5th inst., for which we are indebted to Messrs. Aitken, Spence & Co.:—The directors beg to submit herewith the accounts for the year ending March 31st, 1900.

The balance of profit and loss account, after writing off 10 per cent. depreciation in value of machinery and buildings is (including £333 7s 9d brought forward from last year) ..	£842 1 0
Out of this sum the Directors recommend a dividend of 3½ per cent. on the preference shares	350 0 0
Leaving to be carried forward to next year	£492 1 0

The tea crop for last season amounting to 345,220 lb. is largely in excess of any past year, mainly attributable to the careful application of artificial manure on different parts of the Estates. The Directors purpose continuing the treatment as may be required.

Prices for tea have not been maintained, and the average of the Company's crop is barely 5½d per lb., against fully 6¾d per lb. last season. This has negatived almost entirely the profit which was expected from the increased yield.

The Directors have excellent accounts of the cardamom clearing, and have decided to increase it from 40 acres to 70 acres. This work is now in hand. A small quantity of cardamoms have been taken off the 40 acre clearing, which shews good quality.

The Engine and Boiler being too small for present requirements, besides being considerably worn after so many years use, the Directors have decided to replace at a cost of between £500 and £600. The order has been entrusted to Messrs. Brown & May.

One Debenture Bond for £500 has been paid off during the year. Mr. Spence retires, by rotation, from the Direction, and being eligible, offers himself for re-election. The Auditors, Messrs. Brown, Fleming and Murray, also retire, and offer themselves for re-appointment.

RHEA AGAIN.—We have not lately heard much of rhea locally; but with the Northern line open, we should hear more of it in a few years. The following news published by the *Friend of India*, is encouraging:—"A new demand, which promises to be permanent, has arisen for rhea. Messrs. Thirkell & Co., of Fenchurch Street, London, have written to the Secretary and Curator in the Indian Section of the Imperial Institute, to say that they are prepared to take at £15 per ton, all the rhea ribbons that India can produce for some years to come, and they offer to supply at £40 each, decorticators which are capable of preparing about ten cwt of stuff a day. Government has been asked to foster the cultivation of rhea as much as possible. In forwarding the correspondence on the subject to the Bengal Chamber of Commerce, Dr. Watt, the Reporter on Economic Products, observe that Messrs. Thirkell & Co. require the rhea ribbons in their crudest form."

TEA ESTATE CULTIVATION IN CEYLON.

(*By Chairman Dimbula Valley Co., Mr. John Sinclair.*)

THE QUESTION OF USING ARTIFICIAL MANURES

I shall quote a paragraph from an otherwise interesting circular issued by a firm of tea brokers, Messrs. Gow, Wilson nda Stanton, to whom, by the way, tea planters owe much for information which they evidently spare no trouble or expense in obtaining from all parts of the world. The paragraph is as follows:—"Again have producers asked themselves whether manuring will develop permanent strength and vigour sufficient to withstand the strain of continued pluckings, especially in the event of over-production reducing the prices so low that artificial manure cannot be afforded." Now, apart altogether from scientific opinion, the question has been abundantly answered by exp-rience of at least twelve years that artificial manures not only do not develop weakness, but absolutely the reverse, even when pplied with the specific object of increasing the yield, and that by these repeated applications not only are the owners of estates not living on their capital—as it was rather inaptly termed by a gentleman recently in explaining to his shareholders his ideas on the subject, and to whom I shall have presently to refer—but, as I will show, are adding to the capital value of their gardens. If tea drops below the price at which artificial manure can be afforded, woe betide those gardens, which, without it, never yield over 300 lb. per acre. I will tell Messrs. Gow, Wilson and Stanton that but for the use of the very manure they depreciate, a very large number of tea gardens could not for some time now have met expenditure, to say nothing of leaving profit. There are many gardens which have been, by the judicious use of artificial manure, brought from maximum crops of 300 lb. per acre per annum to 700 lb. and over yearly—the former only capable of being laid in London at about 6d per lb. and which, whilst the average price was 8d, left some profit, but which for some time now, and certainly today, would barely have paid cost of production; while 700 lb. has been put in London for less money—namely, 4½d to 4¾d per lb., also a better tea, and even today leav. something for profit—the bushes, too, after all those years of the treatment I speak of, as vigorous as could be wished for, in fact, raised in many cases from having a low job appearance to the very best. Whatever apperehension is professed by some, a walk round the gardens I refer to will demonstrate to the merest tyro that there is no sign of defunction about, and those who saw the places prior to manurial applications can have but one opinion—namely, that the estates are better in every way, and look like lasting longer than non-manured ones.

SCIENTIFIC OPINION.

Now for a little scientific opinion. Probably many of you will have heard of the discussion which has taken place in Ceylon regarding a speech made in London by a director of a large and successful tea Company at a recent meeting of shareholders, the purport of which, I rather gather, took the shape of a warning to planters and those interested in tea to avoid the use of artificial manures, or, to put it more correctly, forcing manures, otherwise the effect would be

dangerous. Now I think I know most of the fertilisers used and the quantities applied, and in no case is there, in my opinion, an approach to overforcing. Now, as more weight may be given to this gentleman's words than they are entitled to, and holding the position he does in one of the most successful tea companies in Ceylon—a success, as he would be the first to admit, not in any sense owing to the exercise of special acquaintance with manuring operations applied to tea—I cannot let his views pass unnoticed, especially as he quoted, in support of them, the authority of perhaps the greatest living scientist of the day—namely, Sir John Lawes, Bart., of Rothamsted. It is of the greatest importance that it be known that the gentleman I refer to has evidently misunderstood Sir John. I trust, therefore, you will bear with me in giving you the facts regarding that, as well as my own opinions derived from a practical experience of 40 years of agriculture in this country and in Ceylon. The director I refer to was telling his shareholders and the world the policy he recommends in the cultivation of that company's gardens, and warning all and sundry against the use of artificial manures, more especially sulphate of ammonia, as being too forcing and exhausting. He winds up with the following words.—"I have also consulted Sir John Lawes, who, you all know is a great authority on agricultural chemistry and he deprecates the use of forcing manures, such as sulphate of ammonia, as being undesirable to use." Now, gentlemen, this rather astounded me, for I have kept myself all these years fairly in touch with the experiments made by Sir John Lawes and his collaborateur at Rothamsted, and applying what I had gathered from that source to tea cultivation, I felt that either the gentleman had not supplied Sir John with all the data which would be necessary for him to form an opinion as to what would be the most suitable manure for the tea plant, with which he (Sir John) had probably no practical acquaintance, or what was even more likely, that Mr. —— had misunderstood what had been said to him. I wrote to Sir John to that effect, giving him all the information I could regarding the tea plant, and I quoted the opinion which had been attributed to him in the above-mentioned speech.

SIR JOHN LAWES'S OPINION.

It was as I had supposed, but his letter speaks for itself. It begins:—"I regret to find that Mr. ——has somehow mistaken my views in regard to the character of manures suitable to the tea plant. This is rather singular, as I told him that some very fine Peruvian guano, said to contain 8 to 10 per cent. of ammonia, had been imported, and I thought it would be a valuable manure for the tea plant. Except tobacco, I should think that the tea plant would require a greater abundance and more forcing manure than any other crop grown." There is more to the same effect, but that, gentlemen, is Sir John's opinion. I would only add that the utmost care should be exercised by planters in obtaining opinions from scientific authorities on points on which, without all the data, it is impossible for them to arrive at a correct conclusion; and when they do obtain it to be sure they understand it, otherwise, as in the case I mention, much harm may follow. If a scientist in agriculture, who never saw a tea bush growing or cultivated, were asked whether this or that manure would be too forcing or cause exhaustion in the long run, the answer would probably be:—"Yes," because he could only bring to bear on the subject his knowledge of what those manures would do for a turnip, wheat or hay crop; but there is a great difference. A tea bush on your properties is pruned, or more correctly speaking, is cut across the hard wood say, 2 feet or less from the ground; the next knifing it gets is 24 months after! In the meantime it has thrown out shoots and grown up to a height of 5½ feet and has produced something like 4,000 lb. of succulent leaf per acre, which, when manufactured, turns out 1,000 lb. of tea. This, gentlemen, is all that is removed from the soil—namely, 500 lb. per acre per annum; the bush before pruning has a mass of green leaf and stalk, as well as matured wood, which, when cut off, weighs not less than 5 lb. per bush, or a total per acre of 20,000 lb., which, if dug into the soil, probably returns more plant food to the roots than has been removed in crop, and for the reason that the tea bush derives a great deal of its nourishment from the atmosphere, the larger proportion of which, along with that derived from the soil, being returned to it in prunings. There, gentlemen, is all the difference between the tea and the hay, wheat and turnip crops which are entirely removed from the soil, and to which if forcing manure only were applied the soil would cease to respond. The tea bush is not usually grown for its seed, which is, of course, a greater strain than growing leaf only. Were it grown for seed production, stimulating manures would have to be avoided. The finest soil, whatever the altitude above sea level, produces in greatest abundance the highest class of tea—that is, the soil which contains in an available form for assimilation by the roots all the different ingredients required for the plant's nourishment. If it is not there in its proper proportion or if any are wanting you will never get a healthy bush or a good tea. Place them within reach of the roots and you constitute a condition even in poor soil which will give you a higher class of tea than your neighbour who does not.

THE MAIN CAUSES OF EXHAUSTION.

You will naturally ask. Why require to add anything further than your prunings, since you say your tea crop does not exhaust the soil? Well, if cropping were the only cause of exhaustion that might be pertinent, but there are two other sources vastly more impoverishing than that of the removal of 500 lb. per annum of tea crop, and these are points which men, seeking aid from a scientist in this country, should not overlook, these are—however well drained the field may be—the removal of the soil by the tropical showers falling on our steep hill-sides and carrying it to the rivers; and even worse than that, the washing in solution to the nearest drain of much of the food ingredients. It is a mistake to suppose that during the heaviest rain, even although wash is not apparent on the surface, it all sinks into the soil; a great deal of it oozes below the surface—carrying, as I say, in solution, much plant food—to the nearest drain, especially where surface soil has been disturbed for manuring purposes. This can often be proved by the appearance of a saline deposit on the upper side or walls of the drain. Entirely different is the case in this country; rarely, if ever, is soil washed away, and rain which falls on the comparatively flat fields finds its way to the subsoil drains, and carries little or nothing away in solution. In tea fields there is no such thing as a subsoil drain

they are open surface drains and act in the manner stated. These, in my opinion, are the main causes of exhaustion on Ceylon tea gardens, and is the reason why additional fertilisers, other than prunings, become necessary in a lesser or greater degree, turning on the configuration of the field and the methods adopted immediately after planting, to stem the wash of soil as well as to protect as much as possible this oozing away by the heavy rains we are subject to. Old coffee estates, such as those I spoke of as yielding but 300 lb. an acre, which suffered from both causes, besides from heavy coffee crops, could only have paid as tea estates for the last year or two by the use of fertilisers, and proprietors of such would indeed be short-sighted to give up their manuring operations with the idea of leaving a better margin of profit. But there is another class of garden, such as those comprising the Dimbula Valley Company's, or, indeed, the bulk of those which were in the coffee days called the young districts, taken from jungle between the years 1865-1885, and which, owing to leaf disease, had their coffee fields denuded of coffee before exhaustion from cropping could take effect, and which by experience gained in the older districts, whereby protection from wash was seen to be imperative, were drained, even before planting with coffee, and so had their original soil practically untouched when the tea plant was substituted for coffee. This is another class of garden, requiring different treatment and justifying a different aim altogether from that followed on the older estates.

THE POLICY OF THE BOARD.

As this is what must interest you, as proprietors of the Dimbula Valley Estates, I will now explain the policy we have hitherto followed in cultivating your properties, and which will assuredly be followed, if I can have my way, so long as I have anything to do with the management. It is well known that if tea bushes on such gardens can be kept in condition, the more frequently they can be plucked the better will be the class of tea produced. Well, our aim is in this direction, and if by plucking every eighth day, or even less, all the year round, you can succeed in getting a strong and vigorous flush—by helping the bush with fertilisers—every eight days, instead of, perhaps, every ten or twelve, you will get, not a larger quantity, but the same quantity as if the bush got no assistance, but of a much higher class of tea. I think it would be a great mistake on an estate with a normal yield of about 500 lb. an acre, without assistance from manure, to add manure in order to get 700 lb. or 800 lb. of inferior tea, which latter is perfectly possible on such estates. Support your bushes for quality, not quantity and in doing so you will in your prunings return more to the soil than is removed in crop. This, gentlemen, is the policy which we are carrying out on your estates, and if the proprietors or company who go to sleep at such a time as we are passing through in tea do not wake up, but adopt some retrograde policy such as that advocated by Messrs. Gow, Wilson and Stanton, woe betide them. You will see that our yield last season was but 512 lbs. per acre, whilst it could readily have been made one-third more. You see, its cost f.o.b. was 25·77 cents per lb. You also see our net profits, and can therefore quite easily judge whether the policy we are carrying out is a sound one. I have no manner of doubt myself, and I am sure the best experts will agree with me.—*Financial Times*, June 26.

TEA TRADE OF KIUKIANG IN 1899.

The annual reports of Mr. T F Hughes, Commissioner of Customs at Kiukiang, are always worth reading, Mr. Hughes's long experience and his habits of observation making his remarks on the course of trade as interesting as the facts on which he bases them. When Kiukiang was opened to foreign trade, it was prominently a tea port; its prominence in this direction dwindled away as the United States took to drinking Japanese tea and Great Britain Indian and Ceylon tea. But Mr. Hughes thinks that the tea business is not irretrievably lost. He says:—

The export of Black Tea in the year under review amounted to 131,145 piculs, or more than 9,000 piculs in excess of the quantity in the preceding year which was itself an advance on the figures of the year before. Brick Tea has also been steadily progressing during the last few years; its export in 1897 was 32,839 piculs, in 1898 it advanced to 33,831 piculs, whilst in 1899 it totalled 43,352 piculs. Green Tea also shows signs of improvement, but as it chiefly passes through this port now to be dealt with at Shanghai, it need not be further dwelt upon here. The reports by experts on the Tea market of the year under review are not so rose-coloured as our figures might lead one to expect. It seems the Keemuns were not, on the whole, as good as in the previous year, whilst the Ningchows were disappointing, the famous Ningchow district, in fact, being likely to be outdone by the preference shown nowadays for the stronger Hankow Oanfa district Teas. A gentleman well versed in the trade favours me with the following interesting remarks:—"The demand for Indian and Ceylon Teas is growing more and more all over the world, and as Chinese teamen refuse to introduce machinery, it is only a matter of time until the China Tea trade dwindles down to a very small item. To an educated palate a fine Keemun is much preferable to Ceylon or Indian; but it is 'strength' (strong cup) that the public now calls for, and the Indian and Ceylon Teas supply this, owing to careful cultivation and machinery preparation. The export of Indian and Ceylon Teas to Russia (hitherto China's biggest Tea customer) is increasing by leaps and bounds." This authority evidently believes, like many others, that by the aid of machinery and more careful cultivation, the Chinese could easily produce Tea in abundance, to suit the present taste of the public, just as Ceylon and Indian teamen do; and if the Government went further and did what other Governments, with such an ancient and valuable industry to revive and foster, would be almost sure to do, namely reduce the export taxes and duty, it is, I think, almost certain that the Tea export from China would ere long regain its old supremacy; indeed it would be hardly too much to say, anomalous as it may appear, that the very reduction of the Tea duty would, by the expansion it would create in the export, before long increase the Tea revenue, whilst the augmented wealth and prosperity of the producing districts would give an impetus and activity to general trade which would be far-reaching in its effects, and would ultimately redound to the well-being of the Government and the country.—*N.-C. Herald*, June 27.

"The Sulphate of Ammonia" misconception, as finally described by Mr. Melville White, elsewhere, does not reflect credit on Mr. G. A. Talbot's estimate of the amount of commonsense appertaining to his brother-planters. To suppose that anyone applied this artificial manure by itself for a series of years to tea, and that it was to have the same effect as on grass land at home, is rather too—too much altogether!

PLANTING NOTES.

Tea Planting: Guatemala and India Contrasted.—Tea planting in the Guatemala, we are aware, could never become a great industry, but we merely mention the fact of the desire of the Government of that State to develope the resources of the country, whereas in this highly civilised land it is the other way about. Every possible check is put to the progress and growth of private enterprise by Europeans, whom the jealous officials still appear to regard in the light more or less of interlopers.—*I. P. G.*, July 14.

Green Teas.—We hear of considerable activity in a number of factories towards beginning the manufacture of green teas; and it is quite expected that half a million lb. will be exported by the end of this year and not less than two millions of "greens" next year. If India gives a fair trial (and its offer of about nine cents a lb. should be an inducement) and makes three or four millions lb., by the end of 1901, the American market should be fully tested so far as British-made "greens" are concerned.

Empire of India and Ceylon Tea Company (Limited).—The report for 1899 states that for the greater part of the year there was good seasons to expect satisfactory results, but at the height of the selling season the market value of medium and fine teas fell heavily, and the fall in price from the beginning of November represents a loss of fully £10,000. The excess of the Indian crop over the outturn of the previous year affected general prices unfavourably, except those of low grades which were maintained by exceptional causes. The mismanagement reported to the shareholders last year necessitated heavy expenditure on some of the gardens in order to bring them up to a high state of efficiency. The net profit for 1899 is £19.853, to which must be added £146 brought forward, together £19,999 After providing for the dividend on the preference capital there will remain a balance of £9,049. The directors recommend a final dividend of 3s. 6d, per share, making, with the interim dividend already paid, a total distribution of 4½ per cent. per annum on the ordinary capital, carrying forward £60 —London *Times*, June 25

Anglo-Ceylon and General Estate, Co.—We publish on another page today the annual report of this Company in which the directors recommend a dividend of 4 per cent on the consolidated stock. There was a large increase in the crop obtained from the tea estates in Ceylon and the quality had been well maintained, but there was a falling-off in price owing to the state of the market. The year had also been more favourable than the previous one for the production of cocoa and the price had advanced. Owing to wet weather there had been a diminution in the sugar crop in Mauritius. Interesting statistics are given as to the acreage in different products. On the Ceylon properties there are 5,606 acres of tea in bearing, 285 in cardamoms and 991 in cacao in bearing interplanted with coconuts not in bearing. In Selangor there are 19[?] acres of coffee not in bearing interplanted with coconuts and rubber and 95 in coconuts and rubber; while in Mauritius the Company owns 4,270 acres (principally of course in sugar) besides being interested in other estates.

Tobacco at Jaffna.—This staple product of this Peninsula is now sold here at a fancy price. The average price of a *Param* of tobacco is R250 as against R150 in previous years. This rise in the price is owing to the heavy damage caused to the crop by the floods of April last. The quantity of tobacco usually exported from here to Travancore and Cochin was between 50,000 and 60,000 bales. It is estimated that only about 35,000 bales will be available for export this year. The merchants have already purchased more than half the quantity grown here this year and the remaining quantity also will be in the hands of merchants in another fortnight. The tobacco used in the manufacture of cigars also commands unusually high price. Jaffna is not, therefore, a loser by the destructive floods of April last.—"Hindu Organ," June 27th.

The Rubber Industry in India.—The *Pioneer* of the 5th July gives the following concise summary of what has been done by the Indian Government to foster a rubber-producing industry:—

The great demand for indiarubber in the European and American markets, due in great measure to the bicycle-craze and to the use of rubber-tyres on cabs and carriages, should be carefully noted in this country. Mr. Ribbentrop, in his recent pamphlet on Forestry, gives a short history of the rubber industry in Assam, which is instructive in its way. In 1873 Mr. Gustav Mann, foreseeing that the natural rubber-resources of the Province would dry up sooner or later, started the Chardnar plantation, and by the end of 1884 some 890 acres had been stocked with *Ficus lastica*. Mr Mann wished to add at least 200 acres annually for an indefinite period and the Government of India favoured this proposal, but the Local Government, having no spare cash, took but a languid interest in the operations and in 1889 the plantation only covered 1,043 acres. Then the Inspector-General of Forests took up the matter and in the next four years 860 acres were added, or slightly more than the annual increase advocated by Mr. Mann. In 8194 the Local Government again threw cold water on the scheme: a calculation was made showing that the net profit realised amounted to only R60 per maund, and this was not sufficient to justify further expenditure. The fact was that the planting had been badly done. The establishment of new nurseries had been neglected, and, "instead of providing a proper continuity of healthy young nursery plants, the undersized and suppressed specimens from the old nurseries were used, which accounted for the comparative want of success in the final plantings of 1893." Matters rested until 1896 when Mr. Hill, then officiating as Inspector-General of Forests, visited the plantation and recommended that the work should vigorously be taken in hand again. New nurseries were established and better results were obtained. In 1898 99 experimental tapping of the trees was tried, and when the rubber was put on the market the net profit realised was R93 or 50 per cent more than that earned in 1893. It has now been temporarily settled to extend the plantation by another 1,000 acres in the next five years. The moral of the story is that unless new nurseries are formed every year, good planting material will not be forthcoming and the industry will lapse into its old state. There is no financial difficulty connected with these nurseries if properly managed; and, moreover, it should be noted that the tea-planters lately have begun to grow *Ficus elastica* on their waste lands, seeing a possible source of extra income from the rubber-tree. In this adventure they should receive every encouragement and the surplus saplings from the nurseries might well be made over to them free of charge as suggested by Mr. Ribbentrop. The Assam rubber-industry is well worth fostering, particularly just now when the profits from many tea-gardens are so small.

THE ROYAL BOTANIC GARDENS, PERADENIYA.

CEYLON.

A few notes, written in the middle of February, on what may be termed a typical tropical garden, may have some interest. Probably at no other time of the year is the contrast between such a garden and an English one greater; not, however, that the latter is without charms even now, more especially in the memory of residents in a land where perpetual summer reigns, and Nature is practically never at rest.

Situated at an elevation of about 1,500 feet above the level of the sea 7° north of the equator, and with a mean annual temperature of 77° Fahr. (as low as 68° being seldom experienced), the features of the vegetation at the above headquarters of the Botanical Department in Ceylon may claim to be fairly representative of those which generally characterise the equatorial regions, and which, when available, are an unfailing source of interest and fascination to the botanist and horticulturist alike. Flanking the approach to these gardens of 150 acres, and close on a century old, is a row of tall, spreading trees, about 140 feet high, with remarkable buttressed trunks and flattened roots, the latter meandering over the ground, suggesting huge saurians. These the new-comer will be surprised to learn, notwithstanding a fair acquaintance with hot-house plants, upon which he is likely to reflect with pardonable pride, are Ficus elastica, an old favourite pot-plant.

On either side of the principal entrance stands a stately African Oil Palm (Elæis guineensis), the gate pillars being completely draped with Bignonia unguis-cati of Brazil, which bears a profusion of beautiful yellow flowers, and occasionally its curious long pods, which are from three feet to five feet in length. Immediately on entering, the visitor is confronted with a very fine oval group of Palms, containing some sixty species, representing all parts of the tropics; whilst forming an effective undergrowth amongst these are several species of Cycads. Overshading the drive on the left is seen a good example of the amazingly luxuriant habit, combined with extreme beauty, which is peculiar to certain tropical climbers; this is the Thunbergia grandiflora, which, though soon becoming an unmanageable weed if permitted, is here allowed to form a dense screen of evergreen foliage, studded with large mauve flowers, reaching, by the support of tall trees, to a height of from 70 feet to 80 feet from the ground. Passing round to the right the completely shaded Nutmeg-walk is reached, and few walks offer more temptation to visit than this. The Nectarine-like fruits hanging from the Nutmeg-trees in abundance, and in all stages of development, mixed with the flowers, some just "setting," others ripe and splitting open, displaying the large brown nut enclosed in the pretty bright red mace; the various other spice-trees—Clove, Allspice, Cinnamon, &c.—all are apt to make the stranger find some justification in Heber's "spicy breezes"—

"Where every prospect pleases,
And only man is vile."

Stretching out from the oval Palm group is the straight main central drive (see Supplement in present issue), which shows a portion of this, but it is impossible, even for the camera, to do justice to the scene, such is the wealth of colouring, the grateful coolness (which can only be fully appreciated in the tropics) from the chequered light, the indescribable mixture of odours, the chatter and cooing of bright-plumaged birds, and the murmur and buzzing of insects. Rising gradually from verges of Amaryllids, is a diversified collection of flowering and foliage shrubs, herbaceous and bulbous plants, shaded by a background of tall trees, interspersed with Palms.

One of the photographs sent represents the Monument Road, which leads to a cenotaph erected to the memory of a former director of the gardens. This stands on a knoll overlooking large expanses of undulating lawns, the lake, the Talipot Avenue (Corypha umbraculifera, the giant of Palms), the handsome bridge of Satinwood (Chloroxylon Swietenia) spanning the river which forms the boundary of the gardens. Along either side of the road is a row of circular beds, planted with more attractive or unique shrubs, and fringed by the large white-flowered Amaryllis solandræflora and others. Over-arching the nearer end are two of the gorgeous-flowered Flamboyant trees (Poinciana regia), half hidden by Petræa volubilis, an exceedingly beautiful climber, producing here in great profusion its sprays of violet and turquoise-blue flowers; whilst the farther end is shaded by magnificent specimens of Terminalia Belerica, Pometia eximia, &c., attaining to gigantic proportions; here also are some Australian Coniferæ—Agathis robusta, Araucaria Cooki, A. Bidwilli, &c.; whilst close to these are such interesting and handsome trees as the Durian tree (Durio zibethinus), which produces excellent but malodorous fruit; the famous Upas tree (Antiaris toxicaria) of Java; the double Cocoanut-Palm (Lodoicea sechellarum); the Mammee-Apple (Mammea americana) of the West Indies; the Brazil-nut tree (Bertholletia excelsa); and the brilliant-flowered Amherstia nobilis and Lager-strœmia Flos-reginæ.

Passing through the Liane Drive there are seen some splendid Lianes, the great copyright of the tropics. Here in the tangle of untraceable festoons of huge and embracing climbers, which soar to the highest tree-top, abound the flying squirrel (Pteromys Oral), an animal of nocturnal habits, similar to a light-brown cat in appearance, and measuring over four feet from head to end of tail, and about the same in expanse of wings. Different from this, and somewhat smaller, is the Flying-fox (Pteropus Edwardsii), a reddish-brown frugivorous creature, of gregarious and nocturnal habits. Certain trees, if tall enough, find special favour with the Flying-fox, colonies of which sleep together during the day, suspending themselves by their hind-legs to the branches, and thus sway gently in the breeze till dusk. Sir John Lubbock said that in the tropics "everything seemed to climb to the light." Plants, beasts, insects, and reptiles climb, the latter including snakes as well as lizards, from a few inches to five and six feet in length.

Continuing on from Liane Drive, a fine solitary specimen of Ficus elastica is suddenly presented in view. The extraordinary character of the roots, resembling bulwarks or fortifications, may be seen to advantage. Creeping up to the topmost branches is the large white-flowered Cereus triangularis.

Incidentally, a tree of Ficus religiosa at Anuradhapura — once an imposing city, and capital of Ceylon, which the merciless jungle buried for centuries, but the ruins of which have lately been partly unearthed—is the oldest historical tree in existence. It was planted 288 years B.C., so that it is at least 2188 years old! This species is endowed with miraculous powers in native religion, and promotes the spiritual welfare of the Sinhalese and other Asiatics. A true Buddhist will sooner sacrifice his pay than cut a twig or pull a seedling of this tree.

In the flower-garden is an octagonal plant-house to the right. Appearing above the latter is the crown of the wild Date-palm (Phœnix sylvestris), next to this being the straight and spiny stemmed Acrocomia sclerocarpa. A tall cluster of Palms with slender stems is Oncosperma filamentosa, and in front to the left is a handsome specimen of Phœnix reclinata, behind which are Calyptrocalyx spicatus, Livistonas, &c. Here also is a variety of the more ornamental tropical climbers trained on trellis-work arbours, where they are seen to advantage. In the beds and borders the most

showy Cannas, the variegated red and white Pineapple (Ananas sativus, var. variegata), Caladiums, &c., make a brilliant display.

Passing through a Fernery and the Palmyra Avenue (Borassus flabelliformis), the visitor comes upon the imposing avenue of Royal Palms (Oreodoxa regia, see *Gardeners' Chronicle*, May 12th, 1900, fig. 96). New and longer avenues of this and other handsome Palms which have of late been planted, may be expected to form in time striking features in the landscape of these gardens.

Purely deciduous trees in the tropics are comparatively rare, and when they do occur they generally do not cast their leaves for the purpose of resting, but for bursting into blossom, followed by the fruit. A good example of this is the silk Cotton-tree (Bombax malabaricum), the large red, edible flowers of which cover the ground for weeks after the leaves have disappeared. Nothing can be more suggestive of a snow storm than when the pods of this tree burst, during wind and rain, and their cottony contents are wafted about thickly in the air.

Taking the river-drive round the arboretum, the scenery is most picturesque. Mirrored in the Mahaweli river (the largest in Ceylon), which surrounds the gardens on three sides, are the feathery plumes of tall Bamboos, giant trees and Palms draped with luxuriant climbers, with imposing hills in the background. A single clump of Dendrocalamus giganteus ("Giant Bamboo," and monarch of the grass family), over 120 feet high, curves gracefully over the river (see *Gardeners' Chronicle*, August 27th, 1881, fig. 54). Apart from the scientific department—the Herbarium, Library, Museum, and Research Laboratory, &c.—there are other features in these gardens which prove equally attractive and interesting to the stranger, but fear of trespassing on your space forbids the mention of more.—*H. F. Macmillan*, June 23rd.

PLANTING IN NYASSALAND, B.C. AFRICA.

22nd May, 1900.

We have the same

BLIGHT ON TEA

here as your estates are troubled with. It came on my tea for the first time during a spell of dry weather in the middle of our rainy season. I also noticed jungle plants, chillies, sou-sop, and bullock heart trees had the same blight, losing their flush of tender leaves and their growth was retarded for about a month. I have no doubt this blight was due to the sudden stoppage of rain, a very unusual thing at that time of year. The tea seems to have recovered and is growing well again. I have just finished gathering a crop from my

FIRST SHADE COFFEE

of over eight hundredweights per acre. The plants are three years old last month, and look as if they had not borne a bean so fresh and green with only a yellow tree here and there where overborne. I do not intend to extend tea cultivation, but in case of accidents to shade coffee (as experienced by the scorching of one's coffee in the open) I mean to have 8 to 10 acres to fall back upon for seed.

CEARA RUBBER

does well here. I have trees four years old 15 feet high with a stem 14 inches in circumference, but what the yield of rubber may be, later on, remains to be seen. I will tap one or two trees in about 18 months' time and let you know the result. Our climate seems to suit Ceara, and if tapped when the sap begins to rise, after the tree is done wintering, the yield should be as much as in its own country.

CACAO.

Only one tree that I know of exists in the country and Mr. Moir of Landerdale is the lucky owner. This climate, however, does not seem to suit this product, for the tree is only about 5 feet high with 3 feet branches and is now some six years in the country. Every care has been taken to keep wind and weather from the plant, and manure has been lavished on it, but it does not thrive; our winter months nearly kill it. Thermometer goes down to 48° and we have often frost in June at night.

GREVILLEAS AND GUMS

do well here: what do you think of Grevillea Robusta eight years old, 100 feet high and 5 feet in circumference at 3 feet from the ground?

I am going to try a kraal this coming dry season,

ZEBRAS

swarm in a certain locality I know of, well suited for the job; and the natives delight in such vacations. In the olden days they used to dig pits and erect fences and drive the game into the pits, but they do not understand catching game alive, they want "nyama" meat. I will let you know my success.—Adieu! H.B.

P.S.—I never get an *Observer* that I do not see the death of somebody I knew when in Ceylon: fancy good John Fraser, John Bagra, and Alex. Ross gone over to the majority, it makes one wonder, when such men go over the border so early, when our turn will come, warning one to watch and be ready. H.B.

PLANTING IN PERAK.

(From the *Administration Report* for 1899.)

The total area of agricultural land alienated in Perak amounts to 244,215 acres, and the chief products

RICE, SUGAR, COCONUTS, LIBERIAN COFFEE, AND RUBBER.

Rice is cultivated throughout the State, but especially in the districts of Krianand Kuala Kangsar, and a large proportion of the Krian *padi*, which is planted almost exclusively by Malays, is sent to be husked in the mills at Penang, whence it is returned to Perak in the form of rice. Irrigation schemes, in connection with the cultivation of rice, are being carried out by Government, or with Government assistance, in every district, and the last harvest was a good one; but the supply of locally grown rice is still quite insufficient to meet the requirements of the State. The cultivation of sugar is being rapidly extended, both on European and Chinese plantations, in all the coast districts. Owing to the low market price of coffee, especially during the earlier months of the year, little, if any, new land was brought under cultivation, but large areas were planted with rubber of various kinds, chiefly *Parà Rambong*. The revenue collected by the Forest Department amounted to $122,616. The work carried out chiefly consisted in the demarcation of reserves, the establishment of nurseries, and the issue and supervision of passes for taking timber and jungle produce. Thirty miles of forest reserve boundaries were cleared and demarcated during the year; nurseries and plantations of rubber (Parà and Rambong), and valuable timber (Merbau. Chengal and Mahogany) were established at Taiping and Pondok Tanjong, in the District of Larut; and, owing to the strict supervision of the Forest Officer and his Assistants, there is now comparatively little illicit cutting of timber and collection of jungle produce, although

the export duties are not infrequently evaded by Chinese smuggling firewood to Penang from the coast districts. This system of smuggling, however, which is chiefly carried out by means of *tongkangs* (Chinese sailing boats), will soon be rendered much more difficult, if not entirely suppressed, by placing a steam launch at the disposal of the Forest Department. The high price of tin has caused an exceptional demand for timber and firewood, in connection with pumping engines and smelting furnaces ; and the export duty on Mangrove, the best kind of firewood, has been specially raised, as the supply is scarcely sufficient for local requirements. The Government nurseries are well stocked with tropical fruit trees, as well as with pepper and nutmegs, and the following economic plants, not hitherto grown here, have been added during the year and are so far doing well :—Jamaica Grape Fruit, Cola Nut, Central American Rubber (*Castilloa elastica*), and Japanese oranges. Owing to the great demand for seeds of the various rubber-and gutta-producing trees, special attention has been paid to the cultivation of these trees, including Parà Rubber (*Hevea brasiliensis*), Getah Rambong (*Ficus elastica*) and Ceara Rubber (*Manihot galziovii*). The vegetables and roses grown on the Larut hills were less successfully cultivated than usual, and this comparative want of success is ascribed by the Superintendent to an abnormally wet season.

BURMA AS A COUNTRY FOR SETTLERS: UNOCCUPIED HILL RANGES.

A very instructive contribution on the above topic has appeared in a recent number of the *Pioneer*, setting forth the too little known advantages of Burma as a land where colonists will find it to their advantage to settle and utilise the resources of the country. The article is signed "M. H."—initials to which we can attach no name with any degree of certainty ; but it is evidently written by one who has the future development of Burma at heart, and yet knows the country sufficiently well to be aware of its disadvantages which he does not conceal from his readers. Rice, the cultivation and export of rice in Lower Burma, was the first product to bring the country into notice, coffee following in its train. But it was not till Upper Burma was annexed that European attention was turned to the new territory, where hitherto it was thought that natives alone could live :

Thus it was, no doubt, that Burma became known as a country unsuitable for European settlers or planters, such as have taken up land in Ceylon and in various suitable districts of both Northern and Southern India, and until the annexation of Upper Burma there is no doubt that this generally accepted view of the resources of the country was a fairly correct one. It is true that even before the annexation of the Upper Provinces, attempts were made to grow coffee in one or two districts where a sufficient altitude could be obtained, but the character of the country of Lower Burma, lying as it does for the most part only a hundred feet or so above sea level, precluded the possibility of favourable elimate being found, except in oue or two exceptional localities. Such coffee as was produced, however, has been pronounced to be of excellent quality, and to have held its own in the market against that grown either in Ceylon or in India.

The annexation of the new territory brought within our rule a vast dry tract, extending from the old frontier of British Burma to the borders of Assam and China. East north and west of this, is the untried field whose "points" the geographical advocate would define:—

Commencing on the west, if we refer to a map we see that the hills which contain the Irrawaddy Valley on this side are the ranges called the Chin Hills, and that the average distance from the river, to which they may be said to run parallel, is some 30 miles, roughly speaking. Now in these hills without penetrating very far from the plains altitudes of up to 5,000 and 6,000 feet are obtainable, and although, perhaps, only the higher peaks reach the latter height yet plateaus, suitable for cultivation, may be fouud averaging the former height, while lower than this localities abound which appear suitable from the point of view of space, soil, water, and drainage, for the cultivation of tea, coffee, wheat and rubber, as well as for the growth of European fruits, which have been already tried in these hills and found to do well. The country is, however, for the most part densely wooded, and a certain outlay of time and capital would necessarily have to be expended in clearing the ground, but this is also the case in most new districts either in Ceylon or India. Two advantages are most evident in the districts to which I refer firstly, that these hills are most excellently supplied with water, streams and small rivers intersecting them in all directions, some of the latter being navigable for country boats, and thus establishing communication with the Irrawaddy, into whieh they all eventually find their way ; and, secondly, that as the hills run generally parallel to the Irrawaddy for many miles north and south suitable localities for every sort of cultivation can be found within a large area, the whole of which is within easy and reasonable distance of the great trade artery of Burma leading to the third largest seaport of our Indian Empire.

The supply of hired labour, it is stated, would depend on the goodwill of the people —up till recently somewhat turbulent, among the Chin Hills ; but likely to improve as the feeling of trust is inculcated by our rule. Passing round to the east of the hills running from Rangoon to Mandalay, the writer comes upon the Shan States whose great recommendation (in contrast with the country just described) is its peaceful character.

Commencing then with the Southern Shan States we have a territory of some 40,000 square miles, a hilly country with mountain ranges running through it from north to south, the intervening space between these almost parallel ranges being high-lying table lands of considerable extent. This table-land consists largely of rolling undulating country, sparsely dotted with clumps of bamboo surrounding villages of Shans and other hill tribes, its width from west to east is some forty miles and roughly it may be said to include about 2,000 or more square miles. The soil is clay gravel and sand, and for miles the eye sweeps over masses of grassy upland, no jungle and in fact few trees appearing, beyond clumps of pine and bamboo in feathery patches. The people who inhabit this country are a different race to the Burmans although there is no doubt, a certain admixture of Burman blood amongst them. They have, however, one common characteristie that of a quiet peaceable disposition, and in this respect differ entirely from the hill tribes living to the west and north of Burma.

Coffee and tea, it is believed, would grow well in the land above alluded to,

As far as coffee is concerned we have a certain amount of data to go upon, the most important of which is that coffee is already grown successfully in the Karen Hills, which lie only a little to the south of the part of the Shan States here alluded to. This one coffee plantation is not of new formation, but has been producing successfully for many years, and although of small extent it yields most excellent returns. There can then be very little doubt that similar ground suitable for coffee may be found in the above portion of the Shan States, which lies only some 100 miles north of the existing plantations, and in the hills which, as will appear from the map, are a part of the same range as those of Karenni.

Lastly we have the question of climate, reference to which is still more encouraging, and a general summing-up of the conditions of life and work in the Shan States, which should tempt many dissatisfied colonists from elsewhere to the heart of this attractive region:—

The climate is a delightful one for Europeans. There is no part of the year when out-door work cannot be engaged in throughout the whole of the day, and with due precautions as to clothing and good housing there is absolutely no doubt that the climate is an exceedingly healthy and bracing one. There are now large tracts of country as peaceful and well governed as any of the districts in Ceylon, India, or Assam, where life and property would be absolutely secure, both in the Southern and also in the Northern Shan States. There is suitable soil and climate, and a very large choice of locality and altitude.

After this well-informed eulogium, we can hear a few of our readers exclaiming: "Who would not go to Burma?" But what to grow: why not cinchona and camphor trees? Any planter dissatisfied with tea sales at 6½d and in search of "fresh fields and pastures new," might do worse than ship to Burma, and proceed

"from Rangoon to Mandalay."

A FARMER'S EVERY-DAY LIFE.

No. X.

(*By "Cosmopolite."*)

In these notes I have frequently made use of the expression

"A PRACTICAL FARMER,"

and, perhaps, it would be as well for me to give some definition of this somewhat vague appellation, such at least as I have been given to understand the expression to mean. A practical farmer is said to be one who thinks he knows a deal more than he really does, and, whenever I have heard a man boastfully priding himself on being a practical farmer, I have surely found, on enquiry or from personal knowledge, that such a man is one who is self-opinionated and who speaks contemptuously of those who try to be guided by science as "book-farmers." Such a contempt has he for this class that he shows it by reading no books himself; by possessing a greatness that never descends to reading an agricultural paper, and by blindly walking along the track that his father and grandfather went before him. He farms on the old short course shift, has more weeds than crop on his ground, wastes his time by attending every market within a radius of twenty miles and bemoans the hard times, instead of taking the goods the Gods provide him and trying to be thankful. But what, more than anything else, I notice about the self-styled practical farmer is the slovenly state of his steading; straw and turnips lying about wasting, the dykes broken down, and the liquid manure running across the roads and down past his dwelling-house. Of course, the practical farmer grows poor crops, nor will he try to learn how to improve them, because, forsooth, he considers that what he does not know about farming is not worth learning. Another peculiarity of the practical farmer is his

DISINCLINATION TO PAY HIS MEN,

the wages due to them; he invariably does so with a very bad grace, and, not unfrequently, gets rid of the man who asks for the money to which he is justly entitled. Some of them even make a point of getting drunk when asked by any of their servants for some of their wages, a proceeding for which I can find no excuse. I have always considered it a very humiliating thing for any one to be compelled to ask for what is his own, so that I have made a point since I took this farm of paying my men every fourth Monday which enables them to go with cash in hand to the shops, and thus buy goods at a much lower rate than if they had to ask for credit. I see no reason therefore, for a practical farmer becoming suddenly and dangerously excited, because asked to pay what he knows is justly due to his men; he himself is paid hard cash for everything that he sells—stock, wool or grain—and why should he not also pay cash? Now that Government is sending to the different parishes,

LECTURERS ON VARIOUS SUBJECTS,

the practical farmer may be improved of himself, for, although he would never dream of listening to any lecture on any farming subject, feeling convinced in his own mind that he knows more about it than the lecturer does, still his own children go—just for the fun of the thing—and they pick up a few new notions which in course of time they may utilise. Lately I took a ride on my bike round a district which is still celebrated as the home of many practical farmers, and I felt quite melancholy as I gazed on the many nice homesteads surrounded by fine trees, looking gloomy, deserted and disreputable. Here and there a farm, evidently in the hands of an *un*-practical farmer, looked like an oasis in a desert, its garden as trim and well kept as those of the practical farmers were weedy, overgrown and desolate. I was told that the laird of the property on which these farm were was in the hands of mortgagees, and could not afford to help his poor struggling tenantry. But I failed to see what claim the tenantry had for help; they took their farms at their own valuation, and should have been prepared to implement the conditions of their leases without bemoaning their fate; and the fact of some of them doing well, although by no means holding the best farms, showed that it was the illiterate practical farmer

who was the stumbling-block, and not the man who was ever ready to go with the tide and fit his work to the present times regardless of what his father did before him. I returned home from my trip, well-pleased that I lived in a district where the practical farmer is practically unknown aud the pushful, hardworking one is the general sample. Referring to the

GOVERNMENT LECTURERS

that have visited our parish, let me say a word. The dairy-maid, who gave a course of lectures on the making of butter and cheese, received, I am sorry to say, scant courtesy from her audience, each farmer's wife or daughter, who attended, having openly declared that she did not know her work, because they each considered their own commodities superior to anything that could be made from instructions out of a book. Here the cloven hoof of the practical farmer showed conspicuously in the behaviour of his wife and daughter. The cooking classes, however, were a great success, the only fault the pupils had to find with their teacher was that she did not show them enough of ways of making fancy biscuits, toffee and sweets of all sorts. One lady, a wistful *ingènue* of about fifty, who attended these lectures, and who is a bit of an amateur cook in her own way, went so far as to praise the work of the teacher, and what more could be wanted than that as setting the seal of superiority on her efforts? The laundry classes also proved the source of much improvement in the style of washing and clear starching in the district. Farmers, who formerly came to church with collars hanging limp-like around their necks. after the fashion of those of the late Mr. Gladstone, now have them standing erect at the sides of their heads, like the blinkers of a horse, and the flannel shirt front, which was once conspicuous at markets, has now given place to the immaculate dickie, like to the product of a steam-laundry, My own experience and observation lead me to the conclusion that the farmer who is constantly boasting about his being so practical is one whose example is to be avoided. His regular attendance at sales and markets seems to have the effect of transforming him, in a few short years, into a first-class tippler and a scandal to his relatives. When the rèveille from the poultry yard wakens him in the small morning hours after a market day, he possesses a thirst worth pounds to a publican and no liquor to be had, nor money wherewith to buy it. Then he curses his fate and wishes he had been appointed a parish councillor or member of a school-board, for well he knows that those who get the handling of the charities of a town are the ones who grow rich and have always plenty of money wherewith to quench their thirst and this he says with a blushing nose and 16 annas worth of scorn in his voice. How many of those practical farmers have I not seen, who, having lost their farms through drink and ignorance, have gravitated to the cities where they are lost in the crowd and the only difference their presence seems to effect there is the enlargement of the police station. But enough of the self-styled practical farmer, and as the Maori would say "Let the *tangata haurangi* (drunken man) slide."

I am sure no one would fancy that any connection existed between

THE WAR IN SOUTH AFRICA AND THE PEAT BOGS OF BUCHAN,

but that such is the case, I think I can show. When our Government determined for the good of mankind to kill off the few thousand Boer farmers in the Free States, they not only sent upwards of 100,000 troops to Africa besides some 30,000 colonials, but they called up all the militiamen and reservists in the country to go into active service. At first the farmers in Britain rejoiced at the removal of these, because those two classes of men are the lowest of the low and from their ranks come all the tramps, incendiaries and light-fingered vagrants. But when the time came for casting the peats, behold the labour for that purpose was found conspicuous by its absence—for these very reservists, etc., are the class that generally do this work; and now we find the price of peats has gone up considerably, not because coals are dearer, not because peat bogs are scarcer, but because the militiaman and reservist are wanted to fight for the shareholders of the mines of South Africa. "Sweet are the uses of adversity," some one says, but however admirable that sentiment may be in the abstract or when applied to others, none of us have any desire for a practical and personal test. Therefore we object to the rise in the price of peats and wish the war was finished and our medal-bedecked vagrants and tramps told off to the duty of casting peats once again.

FERMENTING TEAS BY THE REFRIGERATING PROCESS.

A VISIT TO DUNBAR ESTATE AND AN EXPLANATION OF THE PROCESS BY THE PATENTEE.

[A representative of our evening contemporary furnishes the following report regarding the cool fermentation of tea patented by Mr. H. T. Armitage of Dunbar estate.]

The process of cool fermentation of tea up to the present, has shown results of a highly satisfactory character; in fact, so successful has the new system turned out that ti is considered that since its inauguration in August of last year, the price of Dunbar tea has risen nine cents per lb. This is not, of course, divulging a secret, as the fact is made clear by a comparison of the published price list.

THE PROCESS.

The process which Mr. Armitage has patented, and for which he holds the rights in India and Ceylon, is that of fermenting teas by means of a refrigerating machine worked by compressed ammonia and connected with hermetically sealed cold rooms by a coil or pipe, which enters a tank fixed above the cooling rooms. "One advantage," Mr. Armitage remarked "is that the same ammonia goes through the machine continuously, so that you only have to renew it when a leakage occurs, or something of that nature happens."

The temperance, could be brought down to freezing point, but that there was no necessity to bring it down below 45 degrees, at which point it has been found that fermentation ceases. The process does away with the water tanks, cold cloths, fans, etc., which are at present in general use, and substitutes cold-rooms in their stead. This means, practically, bringing the Nuwara Eliya temperature right down into the low-country. when we saw the machine at work the temperature inside the cold-rooms was 50 deg., whilst the temperature in the factory at four o'clock on a rainy afternoon stood at 67 deg. Generally the temperature outside is about 70 deg.

A NEAT MACHINE.

The refrigerating machine is neat in appearance, and takes up very little room. It is named the "North Pole" and is of Danish manufacture, and turned out by Taxen, and Hammerich on Schous' patent. Mr. Armitage's machine takes about 2½ horse-power to drive it, the power being supplied by a water wheel (an alternative to which is an oil engine), and has a cooling capacity of about 3,800 cubic feet; that is to say, it would keep a room of 3,800 cubic feet in size at a temperature of 40 deg. It is capable of cooling about 250,000 lb. of made tea per annum.

ITS COST.

Regarding the cost of the machine, Mr. Armitage stated that there was very little to reckon with beyond the initial cost. "This machine," he said, "delivered free on board at Copenhagen, cost about £280, including royalty. The next size machine requires 3¾ horse-power to drive it, and is, of course, more expensive and has a larger cooling capacity."

There are, of course, a great many ice-making machines in Ceylon, but the one in Mr. Armitage's possession is the only one that has yet been applied to the manufacture of tea. It may be interesting to state how the idea occurred to Mr. Armitage. On a voyage home he noticed the cold-rooms on board, and the idea struck him that this process of cooling might be made suitable for fermenting tea. He ultimately carried this idea into effect with the satisfactory results already indicated.

ITS ADOPTION IN THE LOW-COUNTRY.

Speaking with regard to the adoption of the process in the low-country, Mr. Armitage stated that there the machine would require a little more horse-power to work it, because of the higher temperature of the water. "We have tried some experiments with low-country as well as up-country leaf, which has been sent us by rail, and the results have turned out most satisfactorily," he said. Mr. Armitage's tea-maker tends the machine, and this would probably be the case on most other estates, as the attention required is not a serious matter. The Sole Agents for the machine in Ceylon are Messrs. Brown & Co., who lay themselves out to arrange for the importation of the machine and, doubtless, could supply estimates for putting up the whole plant.

THE COLD-ROOMS.

Mr. Armitage has a couple of cold-rooms, with a cubic capacity of about 800 feet, and this requires the running of the machine for only three or four hours a day. The walls are first of cement and brick, next is a filling of coir fibre, which is considered to be a non-conductor, and then comes an inner wall of cement and brick. The doors, similarly constructed show a depth of over nine inches. Inside the rooms are angle iron ledges upon which the trays are run in. Above the door of the first room is an apparatus by which a single tray can be taken out so that some idea can be had of how the fermentation is going on, and avoiding the necessity of opening the main door and letting in the warmer atmosphere. The object, too, of having two cold-rooms, is that one is a criterion of what the other is like, the advantage of which is obvious. A record is taken of the temperature at the time the tea is put into the rooms, and during the process of fermentation the average is 51° or 52°. It may be mentioned, in passing, that no fans are used, and one great advantage of the cold-room is that there is a total absence of draught.

"The merit of this process," observed Mr. Armitage, is that we are not plucking fine. Except the newly pruned tea, we are plucking to the extent of two-and-a-half leaves and the bud. Other people who pluck fine get a higher price for their tea, but our prices, if you consider the medium plucking, are very satisfactory."

From the results so far achieved it would appear that the process fully justifies a trial of it in other parts of the island, where anything that will help to raise the price of tea will be cordially welcomed.

INSTRUCTIONS FOR MAKING GREEN TEAS.

FOR EXCELSIOR ROLLER AND TWO 8-TRAY SIROCCOS.

1. Warm the machine by turning on full steam for half a minute. Then place 200 lb. leaf in the machine (freshly gathered) and with 20 to 25 lb. steam in the boiler, steam for 2 to 3 minutes; with 40 lb. steam, 1½ to 2 minutes is sufficient.

The cylinder should never be filled more than on a level with the two steam pipe nozzles at a time, or the leaf will not be evenly steamed. If more leaf is wanted to fill the rollers, it can easily be steamed while the first lo is being put in the roller. The cylinder must be turned round slowly by coolies.

2. When the requisite amount of leaf is in the roller, put on full weight and stand a cooly on top without working the roller for two minutes; this will get rid of most, if not all the water caused by steam, and this must be thrown away. The leaf, before going into the roller, should be perfectly flaccid.

3.—Roll five minutes without weight, and throw away that water or juice; then roll ten minutes half weight; then pour back the juice from this roll into the roller and roll five minutes with hardly any pressure, so as to retain as much juice as possible.

4.—Put this semi-rolled leaf on to Sirocco temperature about 260 degree—and fire for about twenty-five minutes, passing the trays backwards and forwards pretty smartly, and turning the leaf as the trays come out. At the end of this time the leaf should begin to turn an olive green, and feel quite gummy, and be no longer wet.

5.—Take the semi-fired leaf from the Sirocco and put back in roller. Roll five minutes lightly, five minutes hard, and five minutes medium, then break roll (in Souter's breaker); be careful after breaking thus, whether by breaker or by hand;

to thoroughly break up the balls or clots into which the Tea forms. I greatly recommend a Souter's breaker.

6. The leaf being thoroughly broken up, replace in Sirocco, and with temperature of 230 to 280, fire for about 15 minutes until the leaf is like chamois leather—soft, with a tendency to getting crisp, but yet not crisp.

7. Roll again: first five minutes hard, and then about five minutes more, lightly, to get twist, then break roll once more, and finish by final firing at a temperature of 200.

The sieves I used for my break were Nos. 12 and 10, and the balance broken through a No. 8. All the fannings must be most carefully taken out as well as the dust. What Tea will not go through an "8" can be broken up and mixed with the fannings.

I named the Teas:—

No. 1.	New Season's Extra Choicest Green Tea.	
No. 2.	do.	Choicest Ceylon Green Tea.
No. 3.	do.	Choice do. do.
No. 4.	do.	Green Tea Fannings,
No. 5.	do.	do. Dust.

and headed the Invoice with the words "Ceylon Uncolored Green Teas."

H. D. DEANE.

MANUFACTURE OF GREEN TEAS:

IN DEHRA DOON.

The method of manufacturing green tea in the Dehra Doon district for the Central Asian market, is as follows:—

Manufacture can be commenced as soon as the leaf is plucked, but as it is more convenient to manufacture a day's plucking at once, the leaf plucked during the day is allowed to be all night in the leaf shed, spread out from two to four inches deep, and is constantly turned over to prevent heating.

The process of manufacture is as follows:—A large iron *karai* or pan 36″ in diameter by 12″ deep, is heated almost red hot, and when ready is filled with green leaf, which is rapidly turned about to prevent burning, until it has become quite soft, and the mass reduced to about half its former size. This process takes about three minutes. It is then thrown on the rolling table and while the next panful is being prepared, is rolled by the tea-makers. As the leaf is perfectly soft and flaccid, the rolling is done in the same time as the panning takes. If there is any sun, the rolled leaf is then thinly spread out in it until it becomes a blackish green and is very sticky to the touch or if cloudy, is put in *chalnies* over charcoal fires until in the same condition. It is then put into smaller iron pans 25″ in diameter by 12″ deep, which are only heated to such a degree that the hand cannot be kept on the iron. These pans are about half filled, and the leaf is kept turning over until it has become quite soft again, when it is again rolled. When the day's batch has all been rolled a second time, the small pans are filled to the brim, the heat being gradually lowered, and the leaf is cooked, being constantly turned about as before for about four hours, when it is almost dry to the touch. If a large quantity of the two classes of gunpowder are required, it is then screwed up in bags (as described in our last issue) but this is not necessary nor indeed advisable at present, as the gunpowders do not bring the same prices as Young Hyson and Hyson, a quantity of which classes become gunpowder in the screwing. The tea may now be left for weeks in the bins before being classed and coloured, but we will suppose that the next process takes place next morning. The small pans should be heated to the extent of burning the hand if kept on the iron for a short time, and about half filled with the tea, which is worked rapidly from side to side until it assumes a light greenish tint, which will take about an hour and-a-half. It should then be classed, fanned and picked. Before being bagged for market, about the same quantity is put into the pans, heated to the same degree as before and is again worked rapidly to and fro for about two hours until it has assumed all the bloom it will take,—usually a whitish green; but if the leaf is hard and old when plucked, the colour will turn out yellow green, and will require colouring matter, usually pounded soapstone. It is in this last panning that the colouring-matter is put in, but I believe the Europeans in this district do not use it unless requested to do so by the native buyers. It is easily detected by taking a handful of unadulterated tea and breathing on it, when it will be found that as the damp dries off the bloom will return, but will entirely disappear in adulterated tea. The tea is then packed hot in 200-lb. bags composed of an inner cloth and an outer gunny bag, and is despatched in this state to market. In heating the pans, wood is always used, as it is quite as efficient as, and much cheaper than charcoal.

IN ASSAM.

The following method of making green tea in Assam is furnished by an old tea planter:—In making green tea, the flush, *i.e.*, the bud and first two leaves of the young shoot, after being picked and weighed, is carried at once into the factory, and large iron pans, twent-five inches in diameter, and five inches deep, fixed in brick-work over hot wood fires, are piled up with the fresh leaves. The operator in charge then rapidly turns the leaves round, at first with his hand, but afterwards, when the leaves get too hot, with a couple of pieces of wood, like large spoons, until they become perfectly flaccid. The contents of the pans are then thrown out on the rolling table or if machinery is used into the rolling machine, and thoroughly rolled with a sort of figure-of-eight motion until every individual leaf has become twisted and lost some of its sap. The leaf is then taken and spread out thinly on sheets in the sun, or if there is none, as is often the case in the manufacturing season, on fine wire gauze or bamboo trays over charcoal fires, until it turns a greenish-black, and becomes very sticky to the touch. It is then transferred to the rolling tables or machine, and gets a few minutes rolling to retwist any of the leaves that may have been uncurled, and is then put into deep iron pans, measuring thirteen inches in diameter by nine in depth, fixed like the large ones, but slightly sloping forward, in brick work over furnaces, in which there is a hot fire. A man stands opposite each pan, which is filled full, and the mass is turned over and over slowly for about three hours, when it has become almost dry. It is then put into long narrow bags, which are filled as full as possible, and then screwed up tightly, this operation having the effect of turning a large quantity of the larger and coarser leaves into gunpowder, and thereby enhancing their value. Next day the bags are opened, and

the contents—exactly resembling in appearance the Carrigean moss used in Ireland in boiling linens —transferred to the storing bins, where the tea will keep in this state for a long time. To complete the process, as soon as the factory hands have leisure, a slow fire is lighted in the furnaces under the deep pans, which are filled about one-third, full of the unfinished tea, and an operator then proceeds to work the tea to and fro in each pan with his bare hand as hard as ever he can for about an hour, until the combined friction and heat have caused each individual particle of tea to assume the beautiful green bloom that distinguishes green from black tea. It is at this point that the Chinese colour their teas with foreign substances, as, unless the tea has been made from young succulent leaf, it will now appear of a dirty yellow colour, instead of being greyish green. I never knew Indian green tea to be adulterated with any deleterious colouring matter, although we have sometimes been asked by the Central Asian merchants to put a little ground soapstone in to give the deep green colour that their customers appreciate.

After this colouring process the tea is sieved into different classes and is then ready for packing. It is usually put into 200 lb. cloth and gunny bags, as it does not require lead-line chests like black tea.

Green tea-making, although taking a longer time than black tea, is a comparatively simple process, and does not require the anxious attention which must be given to the manufacture of black tea to make one a successful manager.

IN JAPAN.

The following explains the mode of preparation of green tea in Japan. "The firing and preparation of tea for market, as practised in Japan, is as follows:—The Japanese green tea may be divided into three general classes; coloured, uncoloured, and basket fired. The leaf used for all these is from the same plant, differing only in quality, condition, etc. All teas used by foreigners are first fired by the natives in the places where grown. If a grade of coloured tea is to be made this fired leaf (four or five pounds) is taken and put into iron pans or bowls, which are heated sometimes up to a temperature of 212° Fahrenheit. The leaves are then rapidly stirred by hand against the smooth iron surfaces some twenty minutes. A teaspoonful of thoroughly pulverised soapstone (saponite) and five grains, or so, of powdered Chinese indigo are placed in the pan, and thoroughly rubbed into the leaf for about 20 minutes more, when half a teaspoonful of soapstone or gypsum and pulverised tamarack bark (a species of larch) is added, and the stirring and rubbing is continued for 20 minutes more. It is then put into cold pans and simply cold rubbed against the iron surfaces until it has the required polish, which is arrived at in from 40 minutes to an hour. This is the ordinary way of preparing coloured tea. Other materials are perhaps sometimes used, but, so far as I can learn, all are as harmless as these mentioned. The different manufacturers, of course, vary the process a little now and then to produce slight changes of colour. The leaf is then run through three to five sizes of sieves, till all the dust and loose colouring matter is separated. The shrinkage is about 12 per cent. This colouring process is considered beneficial to the leaf, tending to preserve its shape and flavour. There can be no doubt that the Japanese prepared teas are far superior in purity to the Chinese. In colouring Chinese teas various drugs are used that are deleterious to health, unless it be that the heat to which they are subjected render them innocuous. Prussian blue is frequently used instead of indigo in their green, and black lead in their black teas. Uncoloured teas are made in the same way and quantities, and rubbed against the iron pans until the surfaces have the desired polish, and are then sifted until nothing but the whole leaves are left. Basket-firing is done in bamboo baskets, shaped something like our hour glasses, which are shaken over hot pans. The leaf is put into the upper lobe of the basket and worked into the lower, and so, back and forth, until finished. The loss of weight is about 3 per cent."
—*The Planter*, July 14.

PLANTING NOTES.

A Plague of Caterpillars in Jamaica.—Specimens of a large caterpillar from the tobacco plantations of Jamaica were exhibited at the Royal Botanic Society on Saturday. During the past year or two they have increased so rapidly that negro children are employed to collect them, and on one plantation where 5,000,000 have been destroyed.—*Daily Chronicle*, June 25.

Empire of India and Ceylon Tea Company.—The working of this Company during the past year has not been so successful as anticipated, but in the circumstances a dividend of $4\frac{1}{2}$ per cent must be considered satisfactory. The properties in Assam are reported to be in good condition, but the Ceylon gardens are said to require very areful looking into.

Forest Tree Culture in Mysore.—From a Mysore Forest Conservancy Report some time ago we take a suggestive passage. Close planting is properly advocated and it is indicated that the casuarinas in India, like the larches in Britain, rapidly and largely improve poor soil by the deposits of their foliage and the effects of shade and moisture. Mr. Hutchins also advocates close planting. His remarks on the subject are extracted below:—

"With the exception of two plantations, Kadgudi and Benganur, now the best, all the old planting was done at five yards apart. All the planting is now being done at three yards apart which gives 538 trees to the acre. I estimate that the first thinning would be necessary in about eleven years, when a quarter of the stock would be taken out and that the yield of the poles at that age would reimburse the extra cost of thick planting. From a cultural point of view, there is no doubt of the great superiority of dense over sparse planting. Many trees on ordinary soil in this climate remain bushes unless planted close. *Cassi Florida* is an example of this. This is the best tree I am acquainted with for sowings and one of the worst for planting. In the growth of a plantation, the point at which the trees meet in a mass overhead and kill the ground herbage, is well marked, and the sooner it is arrived at, for many obvious reasons, the better. This is the more to be striven for with casuarina on account of the excellent forest soil which forms rapidly as soon as this stage is reached. When planting on inferior soils, no satisfactory growth can be expected till this soil is formed The plantations east of Bangalore are on soil good, bad and indifferent. Most of it belongs to the last class, but there is a great deal too bad to plant, and here seed is being sown. As yet this closing overhead has only been quite reached in the Benganur plantation. The above remarks apply to forest trees, especially those raised by sowing the seeds broad-cast or in shallow pits, as distinguished from fruit trees regularly planted in deep pits and watered."

TO ALL PARTS OF ASIA, AFRICA, AMERICA AND OCEANIA.

Seeds & Plants of Commercial Products.

Castilloa Elastica Cervantes.—Orders being booked for the coming crop of seeds available in June and July, selected seed from very old trees. R. N. Lyne, Esq., Director of Agriculture, Zanzibar, writes under date 24th August, 1899:—"Please send me 200 seeds of Castilloa Elastica for further trial; the seeds of Castilloa you sent me last August germinated very well." Price and particulars in our Circular No. 32; special quotations for large orders according to quantity; immediate booking necessary to avoid disappointment.

Hevea Brasiliensis (Para Rubber).—Orders being booked for the coming crop available in August and September, 1900. This is the only crop of seeds in the year. All orders should reach us before the end of July to avoid disappointment, as we have to make arrangements in time; guaranteed to arrive in good order at destination. We have already booked a large number of orders. A leading Sumatra Planter, who ordered 50,000 Hevea Brasiliensis seeds last year writes under date 27th February, 1900:—"I received your favor of the 12th instant, out of which I learn that you booked me for 100,000 Hevea Brasiliensis seeds for August and September on the same conditions as before, but at the price of—— per thousand." Plants can be forwarded all the year round in Wardian cases. Price and particulars as per our Circular No. 30. A Borneo planter writes dating, Sandakan, 17th August, 1899:—"The last lot of Para seeds turned out very well." Our shipments of Para plants last year has exceeded over 300,000 to different countries. Special terms for large orders on application.

Kickxia Africana (Lagos Rubber).—One of the staple articles of commerce in Lagos grow very vigorously, realizing over 3s. per lb. in the Liverpool market. Seeds and plants, price on application.

Hancornia Speciosa (Mangibeira Rubber).—Besides the value of rubber, it bears delicious fruits, which is a great favourite with the Brazilians, cultivated for both purposes. Seeds and plants, price on application.

Coffee Arabica Liberian Hybrid, Maragogopie Hybrid, C. Stanophylla and other varieties. Price of seeds on application.

Ficus Elastica (Assam and Java Rubber).—Seeds supplied with instructions; price according to quantity. This tree grows equally well in high and low land, in forest and grass land, its cultivation being extended largely by the Indian Government. For price of seeds with particulars as per our Circular No. 33.

Manihot Glaziovii (Ceara or Manicoba Rubber).—Fresh seeds available all the year round; price as per our Circular No. 31.

Urceola Esculenta (Burma Rubber) and **Landolphia Kirkii** (Mozambique Rubber).—Seeds and plants, both are creepers.

Cinchona Seeds.—Different varieties.

Sterculia Acuminata.—(Kolanut). Superior quality, seeds and plants; price on application, packed to stand the transit well for several months, a hardy tree, cultivation easy.

Erythrina Lithosperma.—Thornless variety, new crop of seeds ready in December, May and June. Price according to quantity on application.

Seeds and Plants of Cinnamon, Nutmeg, Clove, Sandlewood, Pepper, Cardamom, Vanilla, Cacao, Tea, Coca, Fibre, Medicinal and Fruit Trees, Shade and Timber Trees, Eucalyptus various varieties, also Palms, Bulbs, Orchids, &c.

Our enlarged Descriptive Price List of Tropical Seeds and Plants of Commercial Products for Foreign Countries for 1899-1900 are now being forwarded to applicants in different parts of the world. Also Descriptive Price Lists of Seeds and Plants of Fruit Trees, Bulbs, Tubers and Yams, and Orchids.

"South Africa."—The great authority on South African affairs of 25th March, 1899, says:—"An interesting Catalogue reaches us from the East. It is issued by William Brothers, Tropical Seed Merchants, of Henaratgoda, Ceylon, and schedules all the useful and beautiful plants which will thrive in tropical and semi-tropical regions. We fancy Messrs. Williams should do good business, for now that the great Powers have grabbed all the waste places of the earth, they must turn to and prove that they were worth the grabbling. We recommend the great Powers and Concessionaries under them to go to William Brothers."

Our new Descriptive Price Lists of Seeds of Shade Trees for Coffee, Cacao, Tea, Cardamoms, &c., Timber Trees, Trees for Avenues, Hedges, Wind and Shelter Belts, Ornamental Trees, Shrubs and Climbing Plants; and Seeds and Plants of Palms, Calamus, Pandanus, Cycads, Tree and other Ferns, Crotons and Dracinas, now being prepared and will be ready shortly.

Special Arrangements made with foreign Governments, Botanical and Agricultural Departments, Planters and others for supplying seeds and plants of Commercial Products in large quantities.

Agents in London:—Messrs. P. W. WOOLLEY & Co., 90, Lower Thames Street.

Agent in Colombo, Ceylon:—E. B. CREASY, Esq.

Telegraphic Address:
William, Veyangoda, Ceylon.
Lieber's, A.I. and A.B.C. Codes used.

J. P. WILLIAM & BROTHERS,
Tropical Seed Merchants,
Henaratgoda, Ceylon.

Correspondence.

To the Editor.

OVER-PRODUCTION OF INDIAN AND CEYLON TEA AND THE REMEDIES.

London, E C., July 5.

Dear Sir,—I do not know whether your attention has already been directed to the letter of Mr. William Mackenzie, which appeared in the *Home and Colonial Mail*, of June 22nd; but, if not, I should like to do so now, and at the same time to add that I sent a criticism of the same by myself which appeared in the issue of the 29th.

Curiously enough, the paper containing my communication contains also a full report of the speech of Mr. James Sinclair, the Chairman of the Dimbula Valley Tea Company, on the occasion of the 4th annual meeting, of the speeches made at which I was quite ignorant. You will see that Mr. Sinclair recognises that for estates whose present average outturn does not exceed 300 lb. tea per annum, manuring is necessary in order to make such estates produce remunerative results at the present low prices, and that if such estates cannot afford the cost of manuring woe betide such gardens.

As pointed out in my letter our most experienced agriculturists fully recognise the necessity of some kind of manuring for all crops, and provided that the climate and rainfall are suitable, the poverty of the soil need be no bar to successful cropping under the influence of judicious manuring.

Of course, economy and suitability must be studied in the selection of the particular manures, and these manures should further be adapted to the soil and elevation of the estate, for the higher the elevation the more nitrogen is required.

Certainly there are estates the soil of which is of so coarse a character, and so poor in quality, that it would be better to allow such land to go out of cultivation and to concentrate attention upon the cultivation and manuring of land better adapted to tea.

It is to points such as these that proprietors and shareholders should direct energetic action, for in these times of low prices, it is essential that personal attention should be given to the management.—Yours faithfully, JOHN HUGHES.

THE CULTIVATION AND MANURING OF TEA: REFERENCE TO SIR JOHN LAWES, BART.

Binfield Manor, Bracknell, July 6.

Sir,—Mr. Talbot, under date the 2nd instant, has favored me with a copy of the letter sent you by last mail. He does not in so many words say so, and I have had no opportunity of seeing him on the subject; but I take it he is under the impression, from the quotation he gives you from Sir John Lawes' letter of the 28th June, that he did not misunderstand that gentleman as I stated he did in the reference to it in my speech to the Dimbula Valley shareholders,

At the risk of appearing to labour the point, whether he did or not, whilst I am willing to leave my letter to Sir John Lawes, (copy of which I enclose) and the quotation from his reply read at the annual meeting of the Dimbula Valley Company to speak for themselves, I must dwell on the fact in order that planters may have the fullest information on the points at issue. With regard to the further opinion which he obtained in writing from Sir John, so that there should be no "misconception on the point", I am afraid Mr. Talbot himself hardly grasps it. In his speech at the C.T.P. Co. meeting he was deprecating the use of forcing manures and referred to sulphate of ammonia as one he deprecated the use of, and intimated that he was backed up in this by Sir John Lawes. Sir John, however, in his letter to me expresses surprise that Mr. Talbot should have misunderstood him, vide quotation from Sir John Lawes's letter to me. The further opinion, although to some extent a qualification of what he wrote to me and for a reason I shall explain, bears out my contention that he does not think that sulphate of ammonia is too forcing, in ordinary doses of course. He says: "My objection to sulphate of ammonia does not arise *because it is a highly nitrogenous manure* (the italics are mine) but because it removes lime from the soil and I find that the Ceylon soils are rather poor in lime"—that is, he does not object to it because it is a forcing manure but because it exhausts the soil of lime. Excepting that he would not disapprove of its use unless on the score that he does not think it the most economical medium of giving a continuous supply of nitrogen to the plants, this is entirely different from saying it is too forcing or dangerous to the life of the tea plant.

At the date Sir John expressed surprise at being misunderstood by Mr. Talbot he was not aware that our soils were deficient in lime, and only came to know of it when he perused the soil analysis given in Messrs. Bamber's last pamphlet, which I presented him with, after the Dimbula Valley meeting; and in talking the subject over with him, he told me that his conversation on the subject of ammonia salts with Mr. Talbot was quite in a casual way; he thus had not the data at that time to enable him to arrive at the somewhat modified opinion he now gives. No one who knows Mr. Talbot would ascribe to him a desire to mislead his fellow planters; but in studying the Rothamsted experiments which he clearly does not fully comprehend and in making his deduction public he is not only doing so, but himself as well. For instance, his personal opinion is "seeing that where sulphate of ammonia has been applied for a series of years on permanent pastures patches of grass are dying out," he is "more than ever convinced that the use of this manure is attended with risk to the tea plant." Now in the first place he is in error in calling the experiment one on "permanent pasture." *It is on permanent grass land* producing hay which has been mowed and carried off the field, every pound of it, twice each year for a series of years, and not *pasture for grazing purposes.* In one case the ammonia, *and that fertiliser only*, let it be noticed, has been applied for a series of years. If it had been grazed upon, and only the nitrogen and phosphates removed in the proeess of cattle-feeding on the field, Sir John would tell him even sulphate of ammonia used by itself would not have had the effect he describes. But where can Mr. Talbot point to a single instance

of a tea field having been manured with sulphate of ammonia alone, or to the extent of two to three cwts. per acre as in the Rothamsted experiments. Half of the smaller dose named and that always in combination with other manures is the quantity generally applied in Ceylon. One may just as well conclude that salt is dangerous to the human race because it would be attended with fatal results if no other food were taken.

I hope at an early date to meet Mr. Talbot at Rothamsted and to see him convinced that there is much yet to be learned before he can venture to apply what he sees there to tea planting and I regret there has not been an opportunity of doing so before, but I could not allow his speech on these matters to pass unnoticed, if for no other reason than that his remarks seemed to me to reflect on those who differ from him and who know he spoke without book, which the London tea shareholder could not.—Yours faithfully

JAMES SINCLAIR.

(Copy.)

1st June, 1900.

Sir John Lawes, Bart, Rothamsted.—Dear Sir,—I take the liberty of addressing you on a subject which is causing some commotion amongst tea planters in Ceylon in respect of manuring Tea Plantations, and as your authority has been given for a statement made by Mr. Talbot, who is a director of a large Tea Company, in recently addressing his shareholders, I am most anxious to have it verified by you as I cannot help thinking that by a misapprehension on the part of Mr. Talbot an opinion has been attributed to you which, if all the conditions under which the tea-bush is planted, grown and cultivated, had been laid before you, you would not have given. I am well aware how frequently opinions are attributed to scientific men which have been formed through incorrect data having been supplied to them. I may mention that I was a practical agriculturist in this country from 1859 to 1868, having been born on a farm and brougbt up to farming, and for 32 years have been in the management of coffee, cinchona, and tea estates. During that time I have kept myself in touch with your experiments at Rothamsted whenever I could find an account of them in print. When, however, I come to apply what I have gathered from my study of these to tea cultivation, I am disposed to think that Mr. Talbot has unwittingly misinterpreted you or that, perhaps when you have the data which I shall here supply, you may modify the opinion attributed to you. Mr. Talbot in his speech, in referring to the danger of using forcing manures, to the tea plant is reported to have said :—" I have also had the advantage of consulting Sir John Lawes whom you all know as a great authority on Agricultural Chemistry and he deprecates the use of forcing manures such as sulphate of ammonia as being undesirable to use." Now I have no doubt that manures, such as sulphate of ammonia and nitrate of potash, etc., used immoderately are to be deprecated as a fertiliser for tea, but I differ entirely from Mr. Talbot when he holds, as he seems to, that those who have been cultivating largely and applying these manures are doing it to an extent which will endanger the normal life of the tea bush by forcing or impoverishing their soils.

To enable you to form an opinion on this and to give your advice as to whether any of the ingredients of the Mixture I, in common with most others in use, I give you the analysis of a fair sample of the soil to which it is applied. (Here follows soil analysis and description and quantities of different manures applied). On the high lands of Ceylon the bush is pruned, or more properly speaking, cut across the hard wood two inches above the previous pruning and practically all the foliage thus pruned falls on the ground, the healthier and more manured the bush has been the greater the bulk of green foliage, but on an average on the estates I refer to each bush gives not less than 5 lb. of prunings which are often left to decay on the surface, but on well-managed estates are buried in holes or mulched in with some such mixture as I have given above. This pruning is done once in 24 months, the weight of prunings therefore, combined with the natural fall of the leaf during the 24 months would run to about 9 tons per acre when green. During the two years between prunings the green leaf taken off the bush for manufacture into tea would weigh about 4,000 lb. before being manufactured: this is all that is removed from the soil per acre as against five times the weight of prunings returned to it. The questions therefore I would ask are the following:—

1. Considering the amount of prunings returned to the soil whether mulched in or not, do you think any of the mixtures named too forcing, and if not, were the quantities doubled what would be the result?

2. Could the castor or rape cakes or any part of the mixture be left from a soil such as that of which I have given an analysis provided the prunings are carefully mulched in a green condition?

To make it more clear to you, I ought to have stated that the tea bush being an evergreen its prunings are quite unlike that of any bush in this pruned in the early spring, the green portion would probably be two-thirds of the whole weight, one-third being matured wood. It is very difficult to say what the life of a tea bush is under normal conditions, but if we take it at 50 years I think the yield would be 350 lb. per acre per annum with no aid from fertilizers, thus the total yield would be 17,500 lb. during its life. Against this on a similar soil the same yield would be got in 32 years with the cultivation we give our estates.

Is there any reason to conclude that the latter would be nearer its limit of life than the former? My experience of 10 or 12 years' manuring operations points to the contrary, but I should be very glad to have your opinion.—I am, dear sir, yours faithfully, (Signed) JAMES SINCLAIR.

[*Please note.*—The answer to this letter was quoted by me in addressing the meeting of the Dimbula Valley shareholders.]—J. S.—See page 112.

GREEN TEA MANUFACTURE.

Stagbrook, Peermaad, Travancore, July 11.

Sir,—In *re* your article* of July 6th in which you ask what my terms for "royalty" on my "process" and "machine" are, I may briefly state that the price of the machine *covers all royalties*, and in comparison with other patent tea machines, the price as advertised by my agents, Messrs. Brown & Co., is a moderate one. What I wish the public to understand is that, if they prefer to use any other "steaming machine" or process of applying steam to "green tea leaf," which is the substance of what I believe my patent covers, that in *that case*, I hold them liable for a special royalty of R250, which must be paid to my agents, Messrs. Brown & Co., for myself and partner in the patent. I do not, of course, expect to exact a royalty on *all* green tea manufactured in Ceylon. "Oolongs," which as most planters are aware, are a *species of Green Tea*, have been made before my patent, and can be made, free of royalty, so far as I am concerned. The leaf for them is rendered pliable by *hot air*, but the fermentation or oxidization is not *ever thoroughly checked* by that process, and, therefore, the

* Local "Times."

"infusions" more or less show signs of fermentation; and, when this is the case, would only get "Oolong" prices and not be classed as "Pure Green Teas," however they were marked.

I have today wired my agents, Messrs, Brown & Co., to advertise that the "royalties" are all *covered in the price of the machine*, and I trust this will be satisfactory to the planting community.—I am, etc.,

H. DRUMMOND DEANE,

THE MANURING OF TEA: DIFFERENT VIEWS.

London, June 29.

Sir,—At the annual meeting of a Ceylon Tea Company held this week the Chairman took me to task—he did not mention my name, but it is obvious he meant me—for the opinion I had expressed deprecating the use of what I termed forcing manures and quoting an extract from a letter from Sir John Lawes to show I had mistaken the opinion he had given me on the use of Sulphate of Ammonia. As I am most unwilling that there should be any misconception on this point and wish that cultivators in Ceylon should have all the information possible on it, I asked Sir John Lawes to give me his opinion in writing and he has been good enough to write to me as follows:—

"June 28.

"Dear Mr. Talbot.—My objection to Sulphate of Ammonia does not arise because it is a highly nitrogenous and soluble manure, but because it removed lime from the soil and I understand that the Ceylon Soils are rather poor in lime." * * *

As far as my own personal opinion goes I must say that after again studying the Rothamstead experiments and seeing that where Sulphate of Ammonia has been applied by itself for a series of years to the permanent pasture, patches of grass are dying out, I am more than ever convinced that the use of this manure is attended with risk to the tea plant.

I have learnt, too from the Rothamstead experiments that when Sulphate of Ammonia is applied, it forms nitrates and a certain proportion of nitrogen passes away quickly with the rain whereas this does not occur where potash and superphosphates are used—hence the advisability of using Basic Slag with Cake Manures.—Yours truly.

G. A. TALBOT,

MR. TALBOT'S EXPLANATION.

July 17.

Sir,—Mr. Talbot's explanation does not seem to simplify the difficulty very much. He agrees that, because sulphate of ammonia *applied by itself* over a series of years, to grass land, appears to be detrimental, therefore, it is so also to tea. Herein, are two fallacies; (1) tea and grass land are scarcely identical and (2) no one in Ceylon, so far as I know, except Mr. Talbot perhaps, has applied sulphate of ammonia, by itself, for a series of years, to tea. Where, then, is the so-called explanation?

Of course, what Sir John Lawes says about its removing lime from the soil is true enough and if carried to excess is detrimental; but this is a difficulty which the practical man can meet and does.—I am, &c.,

A MELVILLE WHITE.

CAMPHOR CULTIVATION.

Kandy, July 18th.

Sir,—At the request of the Committee I herewith transmit copy of a letter received from the Director, Royal Botanic Gardens, on the subject of camphor cultivation.—I am, sir, yours faithfully,

A. PHILIP,
Secretary to the Planters' Association of Ceylon.

Royal Botanic Gardens, Peradeniya, July 11th.

Sir,—The rise in price of camphor, caused by the recent establishment of a monopoly by the Government of Japan, renders it possible that camphor may become a profitable minor product here. I am carrying out a series of experiments with this in view, and should be grateful to you if you would lay this letter before your Association at its next meeting and obtain for me, if you can, any information on the following points:—

(1) Names of estates trying camphor (a good many plants have been sold by this department in recent years). (2) Approximate age of trees, number growing, soil, climate and elevation in which growing, and present size of trees, and whether they grow freely and branch and leaf much. (3) Whether owners are willing to supply a few lb. of prunings for experiments in distillation of camphor.

I propose to work up all information received and all elsewhere available on the subject, with instructions for cultivation, results of distillations, &c., into a circular to be published later in the year.

Any who care to try the cultivation can obtain plants from the Superintendent, Hakgala Gardens, Nuwara Eliya, at 25 cts. per plant.—I am, sir, your obedient servant,

(Signed) John C. Willis, Director, R.B.G.

PRODUCE AND PLANTING.

Japanese Tea.—We recently referred to a Consular report from Tokio which did not take a very cheerful view of the outlook for Japanese tea. A Yokohama report is in a similar strain. It points out that although a yearly grant of 70,000 yen (£7,000 is made by the Japanese Government to the tea guilds for the purpose of extending the sale of Japan teas, no improvement is taking place; on the contrary, the export of Japan teas has been decreasing for some years past. "Nor," adds the Consul quoted, "have foreign tea merchants, who are equally interested with the Japanese dealers in the practical and profitable disposal of this sum, appeared to have participated in any of the benefits—if such have resulted—which this measure was intended to confer." The chairman of the Yokohama Chamber of Commerce paid a visit to the United States with the object of inquiring into the conditions of the tea trade, and seeking the removal of the duty on tea by directly conferring with the President of the United States. The result of his mission we have yet to learn, and meanwhile the Japanese are reminded that in Canada, thanks to "extensive advertising" and such methods, the teas of Ceylon have made rapid progress. In this connection it may be mentioned that the growth of the trans-Pacific trade between the United States and Japan has apparently suggested that higher freight rates may be safely imposed. The representatives of steam lines between Japan and San Francisco have lately held a conference at the American Pacific port, the result of which has been a decision to raise the freight rates for tea, curios, matting, raw silk, and silk fabrics imported into the United States from Japan. The rates for imports from the United States to Japan were also, it is stated, to be raised on the average about 25 per cent.

Tea Sampling.—A correspondent above draws attention to a state of affairs at many of the London Tea Warehouses which is scarcely credible. If the facts be as stated a case for immediate investigation by some competent authority is urgently called for. What guarantee can a buyer have if all the samples which are furnished to him at the docks are taken from one chests? Of course this is a matter which does not immediately concern planters, but we feel sure they would strongly condemn any such practices if they were brought under their notice; and we can scarcely believe that the management of the various tea warehouses can have the remotest idea of such reprehensible conduct on the part of their servants. But it is proper that inquiry should be made, as the complaint is a serious one.

OVER-PRODUCTION OF INDIAN AND CEYLON TEA, AND THE REMEDIES.

(To the Editor of the *Home and Colonial Mail*).

Sir,—I was unable to be present at the annual meeting of the Ceylon Association, but I have carefully read the interesting communication from Mr. William Mackenzie, published in your issue of the 22nd, and can imagine the feelings of despondence, if not of positive despair, that the views expressed in that letter are likely to produce in the minds of shareholders in at present unsuccessful tea companies. In the first part of the letter it is stated that "production has far out-stripped consumption," and further on that "in Ceylon manuring is now helping to swell the output, and to complete the demoralisation of prices already injuriously affected by extensions of area." But after these two statements comes the following: "The price has fallen regularly about ¼d a year, whether production exceeded consumption or not."

If the last statement is correct, there has been a steady fall in prices quite irrespective of relative production or consumption. This steady fall is probably due to a decline in quality, and the only really practical method of removing this pretty generally admitted fact must be the adoption of improved cultivation, judicious manuring, and scientific manufature. Instead of regarding manuring as deterimental to the tea industry, it may fairly be contended that the planter is only following in the steps of all experienced agriculturists, who have found that every crop requires some kind of manuring.

It is now upwards of twenty-two years since I went out in 1877 officially for the Ceylon Planters Association to report as an agricultural analyst upon the manures best adapted to Ceylon coffee and tea soils. After making a very extensive tour of seven weeks through the planting districts, several months were devoted to the analyses of the soil sent from these localities, and since then at great number of soils have been forwarded to me for examination and report, especially during the last two years. With the knowledge thus obtained I have every hope that the application of judicious manuring will be of the very greatest benefit to the Ceylon tea crops. The soils for the most part are poor in the important ele ents of plant food, but the climate and rainfall are both most favourable in Ceylon to the production of frequent flushes of leaf; so that I d not think proprietors should be discouraged by present prices, but rather bestir themselves to energetic action.

I cannot agree with the first remedy suggested by Mr. Mackenzie, namely, that all tea grown in July should be either destroyed or held off the London market, for, instead of doing this, if July tea is inferior, I should recommend that no tea should be made in July; certainly it should not "be shipped to Russia and sold there for whatever it would fetch," becasue that proceeding would be calculated to preju ice the name of Ceylon tea.

With the second remedy recommended, namely, to pluck 10 per cent. less and aim at quality rather than quantity, I however, fully agree; for it is to the improvement in quality that planterrs should look to if they wish to improve prices.

Tea is judged by its quality and purchased according to its quality and strength, so that each individual estate or groups of estates under one management should seek to get a better price according to the care taken in cultivation, manuring pruning, and manufacture.

As to the third remedy suggested, namely to make teas suitable to the American palate, that is a matter that may safely be left in the hands of the author, whose experience of American tastes rightly places his opinion above any doubt, and I think planters would do well to follow the advice given on this point. In spite of the general increased production of Indian and Ceylon tea there is plenty of scope for a higher individual price if attention is properly directed to the points named. Some of our poorest soils can be, and have been, made to yield remunerative crops under the influence of suitable manures, a favourable climate, and personal attention; as, for instance, the early crops of potatoes in Jersey and the spring flowers in the Scilly Isles.

Tea planters, therefore, and those interested in tea properties need not despair, but rather direct attention to careful detail in the growth and manufacture of tea.—Yours faithfully,

John Hughes, F.I.C., Agricultural Analyst, 79, Mark Lane, E.C., June 26, 1900.

THE STRENGTH OF CEYLON TIMBERS.

The current number of the *Imperial Institute Journal* has an interesting article by Prof. W. C. Unwin giving a comparison of the strength of Ceylon and European timbers. Very definite deductions from any set of tests on a limited number of logs must be accepted as subject to correction, but Mr. Unwin has compiled a table of European timbers representing fairly, as he thinks, what is accepted as the average of such results as are most trustworthy. Oak, elm, ash and red pine are included, and it is shown that their heaviness in pounds per cubic foot, W, is 52, 54, 47 and 37 respectively; their crushing strength in pounds per square inch, f.c. 10,000, 10,300, 9000, and 5,800; their transverse strength in pounds per square inch, 12,000, 8,000, 13,000, and 8,300; f.c. W 193, 320, 191, and 157; f.b. W 230, 235, 277, and 224. Broadly speaking, the strength of timber increases with its heaviness. The most valuable timbers for structural purposes are those which have considerable strength without excessive heaviness. The pine timbers so largely used are not only easy to work, but they have good strength in proportion to their heaviness. In the figures just quoted the strengths have been divided by the weights per cubic foot, and the results are given in the last two sets. Com-

pared in this way, elm is superior to oak, and even red pine is not much inferior. The second table deals with Ceylon light, medium, and heavy timbers under the same headings. Sapu, Lunumidella and Walukina as light woods stand at 41·4, 20·4 and 32·4 respectively in heaviness; 3,490, 3,200, and 6,100 in crushing strength; 7,820, 9,510, 5,720, and 9,010 in transverse strength; 84, 157 and 188 f.c. W; and 188, 280 and 280 f b. W. In medium woods the heaviness of Jak is given as 43·4, the crushing weight 7,550, transverse strength 6,840; f.c. W 174; and f.b. W 157; Del 48·1, 6,500, 9,310, 135 and 193; Halmilla 49·9, 7,630, 15,450, 153, and 310; and Suriya 50·3, 6,230, 11,600, 124 and 233. With regard to heavy timbers the figures for Satinwood are 64·3, 5,350, 8,740, 86 and 140, and for Milla 60 9, 6,630, 14,760, 109 and 242 respectively. Taking the light wood, it is clear that as regards strength in proportion to weight, Lunumidella and Walukina stand best. Lunumidella, is not absolutely as strong as red pine; but in proportion to its weight it is even a better timber. Walukina is weaker than ash, and about the same strength as red pine. Of the medium woods, Halmilla is strongest in proportion to its weight, and Suriyamara stands next. The heavy timbers do not give very high results. Satinwood has greater transverse strength than oak, but the strength in proportion to weight is not so good. Milla and Chomuntiri have a little greater transverse strength, but their crushing resistance is low.

COFFEE IN BRAZIL: THE DUMONT CO.

To understand the position properly it is necessary to go back to the statements in the prospectus issued in 1896, and the following table shows the yield of coffee for each of the past eight years:—

		Yield in Cwts.			Yield in Cwts.
1892	...	34,000	1896	...	74,400
1893	...	37,000	1897	...	66,600
1894	..	45,000	1898	...	41,500
1895	...	75,000	1899	...	93,000

The prospectus stated that there were 7,000 acres in bearing, for which the company paid £910,000; 6,000 acres of young coffee, for which £240,000 was paid; and £50,000 was included in the purchase price for land alleged to be suitable for coffee planting. A certificate was given that in June, 1896, there were 4,426,600 coffee trees on the estate, which, at the usual average of 300 trees per acre, would give an area of 14,750 acres planted, and of these 194,000 trees, or 650 acres, were planted in October and November, 1895. At the present time, therefore, the youngest trees on the estate as acquired must be five years old, and, as the plants come into bearing at four years, the whole of the new ground should have yielded berries last season. Yet, curiously enough, Mr. Talbot, who visited the property last year, gave the following figures as to the age of the different fields in September last:—

4,000 acres, 17 years and over
6,300 do between 4 and 17 years
3,000 do under 4 years.

It would be extremely interesting to know when and where these 3,000 acres of young trees were planted, but we cannot throw any light on the mystery, which is deepened by the repeated assertions at the meeting that the yield of 93,000 cwt. represented an average of 8½ cwt. per acre. The area in bearing on this calculation would therefore be about 11,000 acres, whereas according to the prospectus there ought to be at least 13,000 acres in bearing. The only conclusion we can arrive at is that 2,000 acres (nearly one-third) of the old ground, for which the company paid £910,000, have already gone out of cultivation; and if 3,000 acres are under four years of age they must have been planted since the property was taken over on land which, probably, is not suitable for coffee cultivation. All that Mr. Talbot could say about the land (for which £50,000 was paid) outside the Dumont property was that the directors "believed" that it was good for coffee, although it had not as yet been proved. But then the directors are apparently prepared to believe anything.

Another point to which we would direct attention is that according to Mr. Talbot's own figures, there are now 4,000 acres over seventeen years old. Writing about the company's affairs a year ago, we were able to give the directors some information about the peculiarities of coffee-growing, and the had evidently profited by it, for they now tacitly admit the accuracy of our statements on matters which they either ignored or suppressed when the prospectus was issued to the public. We pointed out that coffee plants reached their maximum bearing at the age of from twelve to sixteen years, and that thereafter they yield good and bad crops alternately for a few years, the average steadily decreasing till the land is completely exhausted and no more use for coffee growing. We showed that a good crop was due in 1899, and that the directors' estimate of 75,000 cwt. would probably be exceeded, having regard to the new ground coming into bearing. As a matter of fact the yield was 93,000 cwt., but, according to the ignorant and misleading prospectus estimate, it should have been 130,000 cwt. For the current year the estimate is only 73,000 cwts., although part of the 3,000 acres of young coffee should come into bearing, so that the directors have been forced to admit the truth about the alternate bad crops, although a year ago they scoffed at the theory as inapplicable to the Dumont property.

Obviously, therefore, the 4,000 acres over seventeen years of age will soon cease to yield and, on the assumption that between 2,000 and 3,000 acres have already been abandoned, £910,000 of capital will have been wiped out of existence before the shareholders receive any return on their investment. Mr. Talbot made a great point of the fact that the fields between six and ten years old in 1896 had improved when he saw them again in 1899, but that is exactly what any coffee-planter would have expected. On the other hand, he admitted that the younger fields were very disappointing, and that tends to confirm our view that planting has been attempted on land totally unsuited for the purpose.

ANGLO-CEYLON AND GENERAL ESTATES COMPANY, LTD.

EXTRACTS FROM ANNUAL REPORT.

The net profit, with the balance of profit carried forward from the previous year, after debiting the Debenture Interest and placing £5,007 12s 11d to Reserve, as shown in the audited accounts annexed hereto, amounts to £17,201 1s 5d, and the Directors recommend the payment thereout of a Dividend of 4 per cent. on the Consolidated Stock of the Company, leaving a balance of £7,201 1s 5d to be carried

forward. This Dividend will, if assented to by the meeting, be payable on the 20th July, 1900, at the London Office of the Company's Bankers.

The year in Ceylon was favorable to the production of Tea, and partly on this account, and owing also to the considerable acreage of young Tea which has recently come into bearing, a large increase was obtained from the Company's Estates. The Tea crop, which in the previous year amounted to 1,541,691 lb. from the Estates' leaf and 25,121 lb. from bought leaf, rose to 2,064,515 lb. and 70,103 lb. from the Estates and bought leaf respectively. The crop of Cocoa amounted to 1,938 cwt. as against 274 cwt. in the previous, very unfavorable year. The gross price of the Company's Tea was equal to 7.70 pence per lb. as against 8.59 pence per lb. in the year 1898-99; this difference is fully accounted for by the general fall of prices in the market, the quality of the Company's Teas having been well maintained. The average price of the Cocoa was 73/3 as against 70/1 the previous year.

In Mauritius continued rains during the months of August and September delayed the ripening of the canes, and caused a considerable diminution of the expected crop, for the canes, though large, were inferior in quality, and the general yield of Sugar was poor. Prices for Sugar in Bombay ruled low until almost the end of the financial year, and increased rates were only obtainable for the latter part of the Company's crop. 116,187 tons of canes were handled on all the Estates in which the Company is interested, and produced a crop of 10,723 tons of Sugar, as against 13,526 tons in the year 1898-99. Owing to the poorness of the season under review the realisations from La Flora and the Highlands Company's lands sold to cultivators were somewhat restricted. Out of R81,564 received, R50,000 were diverted to pay off the remaining charges and of the rest, part was employed in providing cheaper transport for Britannia, while the balance has been applied to the reduction of the value of the Mauritius Assets.

The result of the working of the Estates in Ceylon and Mauritius respectively is given in the Profit and Loss Account, calculated at the average rate of exchange of 1/4⅝ as against 1/4½ in the year 1898-99.

The prospects of the current year and the condition of the Estates, both in Mauritius and Ceylon, are reported to be good. A statement of the acrages is given in the Schedule annexed hereto.

Mr. C E S Bishop, under the provisions of the Articles of Association, retires from the Board, and, being eligible, offers himself for re-election.

The Auditors, Messrs. Welton, Jones & Co., also retire from office, and have expressed their readiness to act if re-elected.—By Order of the Board,

21st June, 1900, HENRY GREEY, Secretary.

CEYLON TEA ESTATES.

Estates.	Districts.	Tea in bearing 1899-1900.	Tea not in bearing 1899-1900.	Cardamoms.
Bellwood	Hewaheta, Lower	266	—	57
Craigie Lea	Dimbula	682	27	—
Dangkande	Matale, East	303	25	58
Darrawella	Dikoya	584	11	—
Delmar	Udapussellawa	791	100	3
Glendevon	do	409	14	—
Loolecondera	Hewaheta, Lower	1,107	93	95
Nilloomally (3/4ths)*	Kelebokka	372	35	72
Sinnapittia	Kadugannawa	335	—	—
St. Coombs	Dimbula, Upper	45	140	—
Stellenberg	Pussellawa	426	89	—
Wattawella	Dikoya, Lower	286	57	—
Continued below		5,606	591	285

* New Clearings planted 1899-1900 are 4.

Estates.	Districts.	Fuel Reserves & Nurseries.	Forest, Chena, &c.	Total Acreage.
Bellwood	Hewaheta, Lower	94	79	496
Craigie Lea	Dimbula	100	—	809
Dangkande	Matale, East	37	109	532
Darrawella	Dikoya	22	58	675
Delmar	Udapussellawa	60	389	1,343
Glendevon	do	43	16	482
Loolecondera	Hewaheta, Lower	258	413	1,966
Nilloomally (3/4th)	Kelebokka	52	219	754
Sinnapittia	Kadugannawa	80	341	756
St. Coombs	Dimbula, Upper	—	231	416
Stellenberg	Pussellawa	—	74	589
Wattawella	Dikoya, Lower	18	391	752
		764	2,320	9,570

CEYLON COCOA AND COCONUT ESTATES.

In Dumbara District.

Estates.	Cocoa in bearing interplanted with Coconuts not in bearing.	Cocoa not in bearing.	Sundries.	Fuel Reserves, Grass. &c.	Forest, Chena, &c.	Total Acreage.
Kondesalle	509	85	43	223	20	880
Mahaberiatenne	482	—	—	116	664	1,262
	991	85	43	339	684	2,142

SELANGOR COFFEE ESTATE.

In Klang District.

Estate.	Coffee not in bearing interplanted with Coconuts & Rubber.	Coconuts & Rubber.	Forest, Chena, &c.	Total Acreage.
Bukit Rajah	490	95	616	1,201

MAURITIUS ESTATES.

Estates.	Under Cane.	Cane lands under rotation.	Other lands.	Total Acreage.
Britannia	1,511	226	770	2,507
Cent. Gaulettes	689	159	915	1,763
Estates in which the Company is interested :—				
Beau Sejour Sugar Estates Company	2,107	1,360	1,243	4,710
Bon Air	466	7	144	617
Highlands	327	96	369	792
La Flora	—	—	268	268

FRUIT IN SOUTH AFRICA.

A man who has a very large estate with millions of fruit trees in South Africa finds that it takes two years for well-trained English gardeners to get used to the soil and atmosphere before they will succeed out there. Trees and grain need very different planting in South Africa, the English modes do not answer there.

The correspondent to the "Women's Agricultural Times," who gives this information, says that as the railway freight makes produce grown far from the coast valueless for England, this estate owner thinks of having his fruit tinned and dried, and for this he might employ ladies who might develop the industry very much. Grapes, oranges, cherries, pears, lovely apples, blackberries, peaches, strawberries, apricots, and even English gooseberries (which require frost), grow in that part of the Orange Free State bordering on Basutoland, yet tons of fruit must rot yearly for lack of means to get it to the coast.—*Home paper*, July 3.

ZOOLOGICAL GARDENS FOR COLOMBO.

A proposal has been made to establish zoological gardens. The position of Colombo is so exceptionally favourable that the success of such an institution is practically assured, but it is open to question how far it should be supported by Government, and how far left to private enterprise.

There may be some difficulty in reconciling the ends of science with those of the promoters. If the institution receives Government support, it must be of value from a scientific point of view, and must not degenerate into a bear-garden, while a number of cheap and common specimens sufficient to attack the ordinary sight-seer would probably serve the purpose of a company better than a really valuable zoological collection.

The question of a site is a serious difficulty owing to the greatly enhanced value of land in the vicinity of Colombo, but this can doubtless be overcome if the undertaking receives the support of Government.—(*Mr. Fowler's Administration Report on Western Province for1899.*)

A YOUNG SCIENTIST AND PATENTEE.

We are much pleased to have the following information from Mr. Carruthers, respecting the son of an old and esteemed friend, and one who will yet, we believe, reflect great honour on Ceylon, the place of his birth :—

"*Re* your note in the *Observer* about H. Martin Leake who is going in for plant pathology, much to my delight, as I am sure no one ever regrets choosing such an intensely interesting corner of biology—this cutting (from advertisements of "Nature" this week) will show that he (H. M. Leake) has already been of use to workers at science by the Microtome which he patented: he made a model for his own use and it had so many improved points, as compared with the 'Cambridge rocker' and other instruments, that on advice and hints from different people, he has patented it. I got the first one made, which I am using now in the Laboratory here, and am quite as pleased with it as I thought I should be, when I talked it over with him and we tested it in the Botanical Laboratory at the British Museum." The advertisement is as follows :—

W. G. Pye & Co., "Granta" Works, Mill Lane, Cambridge. Makers of Physical, Physiological, and other Scientific Instruments. Sole Makers of Leake's Patent Flat-cutting Rocking Microtome. Unsurpassed for ordinary work, unequalled for Botanical work. Price, as illustrated, in Case, £6 6s 0d.

PLANTING NOTES.

Mr. Hart, of the Botanical Department, is offering plants of *Kicksia elastica* for sale. This produces the Ire rubber of the West Coast of Africa, and is doing remarkably well in Trinidad. —*India Rubber Journal.*

Rubber.—The Sandakan correspondent of the *Singapore Free Press* writes :—" I hear it is intended to turn Mr. De Nijs' rubber plantation on the Labuk River into a Company shortly, but whether any shares will be offered to the public or not has as yet not been announced."

Ceylon Tea Plantations Company.—We are very glad to learn that Mr. William Herbert Anderson has joined the Board of the Ceylon Tea Plantations Company, Ld., in place of the late Mr. Henry Tod. It will be remembered that Mr. Anderson sold his Waverley and East Holyrood estates to the Company some years ago; while all who know him will agree with us that we should have difficulty in finding a better man than Mr. W. Herbert Anderson in connection with the Ceylon Planting Enterprise.

The Society of Experimental Fish Culture—held a meeting at the Crystal Palace, not long ago, at which (*inter alia*) Mr. Alfred Allison pointed out that the " society could not have been organised except at great expense, but for the facilities which the Crystal Palace afforded. Anyone who examined the aquaria as he had done would know they were the best in the land. Abundant basins, &c., were there, and in them he had, on bright days, seen fish basking in the sun—a sure sign that they could and did thrive in the Palace waters. With regard to the hatcheries, he believed the shrewd curator used purified water, as he should do, and the comparatively small quantity required for this purpose was quite easily obtainable. By promoting the culture of fish, apart from the likings of fishermen, additional pleasure and most instructive education would be given to the public. Only the other day he had heard from Ceylon of the successful operation there in connection with fish culture, and if they could succeed it was perfectly certain we could also." The correspondent who calls our attention to the above, pertinently asks :—" Why not have an aquarium for pearl oysters attached to the proposed Zoological Gardens for Colombo?" Why not indeed; but first we must get the Zoological Gardens.

FRUIT CULTURE IN QUEENSLAND.

By Albert H. Benson.

THE COMPOSITION AND APPLICATION OF MANURES.

In the previous part of this article I have endeavoured to show the necessity for manuring, how plants feed, and what foods are required by them. I have endeavoured to show that plants require various foods in order to produce payable returns, and that the fertility of a soil is dependent on its containing these plant-foods in an available form. I now come to the import question of the composition of the various manures, and the methods of applying them in order to obtain the best results from any particular fruit or farm crop to which they are applied.

The old definition of the term "manure" was a very comprehensive one, as it practically included every material the application of which to the soil would more or less increase its productiveness.

This has, however, been considered too vague, and the term "manure" is now commonly understood to refer to farm manure, or, as it is commonly called, farmyard manure, stable manure, dung or muck which consists of the solid and liquid excrements of the various farm stock, mixed with more or less straw or other absorbent matter, or to any other refuse matter, mulch, compost heap, &c., obtainable on the farm. All other manures are classed as commercial fertilisers, as in the majority of cases they are not produced by the farmer, but have to be purchased by him.

Farm Manure.

As already stated, this manure is composed of the solid and liquid excrements of all kinds of farm stock, mixed with a greater or smaller propo rtion of absorben matter. Such absorbent matter consists of straw, dried grass or weeds, ferns, cornstalks, &c., or often, in the case of animals kept in towns, of sawdust ashes, road scrapings, &c. It is a general or complete manure—that is to say, it contains all the essential elements of plant food in a more less available form, though not always in the most desirable proportions for all plants. Farm manure is greatly neglected in this colony, and even where conserved, it is usually so badly handled that the greater portion of its manurial value is either leached out or burnt out before it is applied to the land.

The composition of farm manure varies considerably, and depends largely on the kind and condition of stock producing it, the food they are getting, and the care given to the manure when produced.

Thus the excreta of young animals is alawys inferior to that of adults, as they extract more from their food. The excreta of cows and pregnant animals is also inferior in that they abstract more from their food to produce the milk or foetus respectively. The quality of the food always influences the value of the excreta; thus when stock are fed on foods rich in albuminous matter such as cow peas, beans, cotton-seed, &c., the excreta is rich in nitrogen. The excreta from well-fed animals is also superior to that of ill-fed animals or those in which the food ration is badly proportioned. The kind and amount of the absorbent material used also influence the value of the manure; so does the treatment that it received before it is applied to the land. If thrown out in the open, and the sun, wind, and rain have free access to it, from one-half to two-thirds of its manurial value is rapidly extracted from it, but if kept covered and looked after the loss is only slight. It will thus be seen that it is an exceedingly difficult matter to determine the value of farm manure produced in this colony, especially as there is no analytical data to go on, and the values given by English, German, and American authorities are of little if any guide here, as the conditions under which the manure is produced are totally distinct. However, in the case of well-fed cows, pigs or horses the manure, if well cared for should be worth at least 5s, to 6s. per ton according to the Sydney standard of manurial values, though the best American anthorities consider that 10s. is a fair average for weel-made mixed farm manure. Besides its purely manurial value, farm manure has several valuable properties, and it is to this that it is owes its especial value in this colony.

Farm manure contains a large proportion of organic matter which, when added to the soil, tends to improve its physical condition, making it easier to work and more friable. It also tends to increase the powder or the soil to absorb and retain mostnre—a most important consideration in a climate such as this when dry spells are more or less frequent. It also tends to free unavailable plant food present in the soil and to retain nitrogen.

Most of our soils are deficient in organic matter and nitrogen; hence anything that will tend to improve them in this respect is of the greatest value to our cultivators. Before leaving the question of farm manure there is one other point to be considered, and that is the utilisation of waste farm products and converting same into compost heaps with or without the addition of lime or commercial fertilisers. As a rule, these waste products are burnt or otherwise destroyed, and, in the case of orchards especially, their loss is a very serious one. All weeds, corn stalks, pumkin, vines, banana stalks, leaves, bush scrapings, and all so-called rubbish, which is usually burnt, should be gathered and placed into a heap together with the cleanings out of any ditches, drains, or road sides. The heap should be carefully built, and have sufficient soil mixed with it to keep it firm and cause it to rot properly, and should be covered by sheets of bark or iron, or by 6 inches or more of soil, to keep off heavy rains when once well wetted through. When partially rotten it should be turned over, and, if desirable, lime can be added, but lime will free the nitrogen present, and if there is not sufficient soil to absorb it as soon as it is freed it will be lost. If desired, phosphatic or potash fertilisers can also be added to the heap when turning and this will greatly increase its manurial value. Such a compost heap shoud be made on every orange-orchard, especially those that have been in bearing for some years, as it will be found to be the best and cheapest way of keeping up the fertility of the soil. The old orange-growers of Cumberland County, New South Wales, always considered a good top dressing of bush rakings and soil—which was practically a compost—the best possible application to the soil, and they often consider that the deterioration of many orchards is due to their inability of recent years to obtain the requisite amount of bush scraping needed for the top dressing of their trees.

There are other manurial agents about the farm that are often neglected, such as the fowl manure and nightsoil, and both of these can either be mixed with the manure or compost heaps with beneficial results.

Farm manure, including compost heaps, can be applied to fruit trees either in the form of a mulch, or it may be spread over the ground and lightly ploughed or forked in. In the case of farm manure to be used as a mulch, the sooner it is used after it is made the better, as there is little if any loss once it is spread over the surface of the land. The disadvantage of fresh manure is that is apt to produce an enormous crop of weeds, whereas, when properly made, the fermentation it has undergone has been sufficient to destroy all weed seeds contained to it. In the case of farm crops it is usually best applied by being spread broadcast over the land and then ploughed in, or if desired it may be placed in drills, and the plants, such as cabbages, potatoes, &c., planted on top of it; for this purpose, however, it is advisable that it be well rotted, as if too fresh it is apt to keep the soil too loose, especially if it is of a sandy nature, and thus cause the plans to dry out should a dry spell ensue. In heavy clay soils that are deficient in organic matter it is

best to apply the manure fresh, as in this state it tends to keep the soil open, and thus render it more friable. No farmer or fruitgrower can afford to neglect farm manure, as is the common practice at present, as, no matter how rich the soil, continuous cropping is bound to deplete it of its available plant foods; and our heavy rains and high temperature rapidly exhaust the humus or organic matter in our best scrub soils, thus rendering them more difficult to work, less retentive of moisture, and deficient in nitrogen. I cannot emphasise too strongly the importance of conserving all farm manures, and I strongly recommend all fruitgrowers and farmers to make the most of all home resources of fertility before they spend their money on commercial fertilisers. Home manures should always from the basis of all manuring, and they should be supplemented.

Commercial fertilisers may be divided into two classes; complete fertilisers and especial or incomplete fertilisers. The former contain all the principal plant foods such as nitrogen, phosphgric acid, and potash, in varying proportions, whereas the latter contain only one or sometimes two of these essential elements.

There are a large number of commercial fertilisers now on the market, a considerable proportion of which consist of the refuse of our meatworks and boiling-down establishments. These fertilisers consist mainly of blood, bones either fine or coarse, and dried refuse flesh. They very considerably in their composition, owing to the source from which they are obtained, and are valuable on account of the nitrogen and phosphoric acid they contain, but as they contain practically no potash they rank as incomplete fertilisers.

A good average sample of a bone and blood fertiliser should contain from 6 to 7 per cent. of nitrogen, and from 12 to 14 per cent. of phosphoric acid, and be worth from £4 4s. to £5 per ton. The nitrogen is available, and is valued at 10s. per unit—that is to say, each per cent. of nitrogen present in the fertiliser is worth 10s. per ton. The phosphoric acid is insoluble, and is only worth 2s. per unit, and the rapidly with which it becomes available for plant food depends on the fineness to which it has been ground: thus, fine bonemeal is rapidly acted upon by the carbonic acid in the soil, and rendered soluble and available for plant food, whereas coarse bones only become available slowly, and their action lasts over a considerable time. When quick results are required the manure should be ground as finely as possible; but for crops such as fruit trees, which occupy the soil for many years, it is advisable to have a proportion of coars material mixed with the fine, so that the action of the fertiliser may be more lasting. The proportion of nitrogen and phosphoric acid in such manures varies considerably, and it is dependent on the amount of dried blood, bone matter, or dried flesh present. When there is a large portion of dried blood or flesh, then the nitrogen is high: but when there is a greater proportion of bone matter, then the nitrogen is lower and the phosphoric acid higher.

Instead of mixing the blood, bones, &c., together, they are sometimes kept separate and sold as either bonedust or blood-manure.

A good sample of bonedust should contain from 50 to 55 per cent. of bone phosphate, equal to 23 to 25 per cent. in round figures of insoluble phosphoric acid, and about 3 per cent. of nitrogen, and be worth from £4 to £4 5s. per ton.

A good sample of dried blood should contain 12½ per cent. of nitrogen, and be worth £6 5s. per ton; and of nipho, 12 per cent. of nitrogen, worth £6 per ton.

Bonedust is most advantageously applied in conjunction with other manures, such as superphosphate, sulphate of ammonia, or sulphate of potash, but if it is used alone it should be applied to the land some time before it is required; otherwise it will not be available on account of its insolubility, but will tell more on the succeeding crops than to that to which it is applied. Blood and nipho, on the other hand, are in a readily available condition, and the crop to which they are applied derives a quick benefit therefrom. They can, therefore, either be applied at the time of planting the crop or can be used as a top dressing by being applied broadcast, and either harrowed, cultivated, or chipped in according to the nature of the crop to which they are applied. Neither blood nor nipho are complete fertilisers, as their manurial value depends entirely on the nitrogen they contain, and, before they can be made complete, must have phosphoric acid and potash added.

A second class of commercial fertilisers are these special fertilisers containing only one element of plant food, usually either nitrogen or potash—such as sulphate of ammonia, nitrate of soda, sulphate of potash, muriate of potash, and kainit.—*Queensland Agricultural Journal.*

(*To be continued*).

OSIER OR WILLOW, CULTURE FOR INDIA AND CEYLON.

The cultivation of Osiers, *i.e.*, species or varieties of Willow which are specially adapted for basket-making, should prove successful, if not a profitable industry, in the hill districts of India and Ceylon. This perhaps is already an established fact in the former country, though apparently Willow culture has never tempted a proper trial in Ceylon. Considering the importance of this industry in Europe, more especially in France and Germany, where it gives employment to many thousands of persons, it is not surprising to hear of fresh interest being manifested in its development in America and Australia. The U. S. Department of Agriculture, Division of Forestry, has lately issued a pamphlet on the subject, dealing with the cultivation and use of Osiers, together with notes on their geographical distribution and characteristics.

Willow-ware should win popularity in India, where the best of timbers are affected by the climate, becoming expanded in wet, and contracted in dry weather. Considering also the universal habit of the natives in carrying everything on their heads—which with even field or factory labourers is practically the only mode of transport—and the immense number of baskets which must consequently be used in the various agricultural and other industries, light Willow baskets should, in certain districts, find a ready demand. Though bamboo or rattan wares, perhaps, answer the purpose equally well, these are not everywhere easily procurable, and in some localities their cost is probably more than what the Willow article could be supplied for. Besides transport-baskets, tea-baskets, manure-baskets, etc., the flexible Willow shoots are fitted for a great variety of useful and ornamental articles of wicker-work, the making of which should prove a favourite and remunerative occupation for many natives.

Willow cultivation involves but little care or expense. A marshy soil by the side of streams or rivers, or round lagoons, such as is unfit for other agricultural pursuits, is the most suitable. No manuring is required, and a renewal of plants is seldom necessary. Propagation is usually effected by cuttings, which should be about 15 inches long and planted in lines 2 feet apart. A crop may be expected in the second or third year. Planted on sloping swampy land, Willows should also serve the purpose of binding the soil and preventing it being washed away in heavy rains.

Among the best Willows for basket-making are: *Salix amygdalina, S. viminalis, S. purpurea S. lucida*, and *S. caprea.*—H. F. MACMILLAN, Peradeniya, Ceylon.—*Indian Gardening.*

ON CEYLON ROCKS AND GRAPHITES *

BY A. K. COOMARA SWAMY, F.G.S.

Ceylon is surrounded by raised beaches, and has been elevated in recent geological times; fluviatile deposits also occur; the gems for which Ceylon is famous are obtained from gravels in the Ratnapura district. With the exception of these recent deposits, the island probably consists entirely of ancient crystalline rocks. Pyroxene-granulites are recorded from several localities; they are dark in colour and greasy in lustre. Foliation is not evident, but it may appear in thin slices. The minerals most frequently present are augite or hypersthene, or both, plagioclase (usually labradorite), orthoclase-microphorite, garnet, quartz, amphibole, magnetite, apatite, zircon, and biotite—the pyroxene and felspar alone being essential constituents. Varieties approach gabbro and eclogite. The texture is granulitic or granular. Centric structures are very characteristic, probably resulting from the corrosion of garnets. Normal granulites are white or grey and usually contain red garnets. The minerals are quartz, orthoclase, and microline-microperthite, plagioclase, and garnet; biotite, magnetite, ilmenite, apatite, and zircon are often present; and the texture is granulitic. Microcline-gneiss, sometimes with hornblende, occurs in conical hills, originating the term domoid gneiss employed by Prof. Walther. The minerals include orthoclase and microcline-microperthite, quartz, plagioclase, biotite, pyroxene, amphibole, pyrite, magnetite, apatite, and zircon. Anorthosite-gneiss, gneissic granite, and pegmatite are also described Dark diorites (containing amphibole, plagioclase, quartz pyroxene, biotite, magnetite, apatite, and zircon), dolerite, hornblende-gabbro, and ophitic quartz-norite are also present. The white, crystalline limestones usually contain pale mica and blue apatite; sometimes also colourless pyroxene. Banded scapolite and wollastonite bearing rocks are found at Galle. Certain rocks, apparently vein products are also described, which contain quartz and calcite micrographically intergrown.

Graphite occurs chiefly in branching veins in igneous rocks, which at Ragedara are granulites and pyroxene granulites. The relations to the matrix are described, and are held to favour the idea of the deposition of the mineral as a sublimation product (Walther), or from the decomposition of liquid hydrocarbons (Diersche). Analyses of several of the minerals, including manganhedenbergite, are given, and a bibliography of the geology of the island is appended.

DISCUSSION.

Professor BONNEY expressed his sense of the importance of this paper, on which he knew that the author had expended great labour. It was interesting to find so great a mass of ancient crystalline rocks practically unaffected by pressure. The relations of the garnets, felspar, and pyroxene were most interesting and suggestive, and so, too, was the mode of occurrence of the graphite. He thought the paper was very valuable as illustrating the formation of a root-like graphic structure, which he thought implied crystallisation under obstruction, while the ordinary rectilinear "graphic" structure (to which the name was originally given) implied that one of the two minerals was not resisted by the other.

Dr. J. W. EVANS referred to the resemblance between the rocks described in the paper and those of Southern India, of which Ceylon was geologically an integral part. Towards the south of the Indian peninsula the ancient sedimentary rocks disappeared, though the extensive granitoid gneiss still continued, The most remarkable fact, however, was the extraordinary development of the chamochite series of Mr. Holland, which appeared to be identical with the present author's pyroxene-granulities. These formed the lofty mountain masses of the Nilgris and Annamalais, and were, it seemed, the chief feature of the most elevated regions of Ceylon. Graphite also occurred in Southern India, not only in dykes in Tavancore, but in flakes in holocrystalline igneous rocks both in Mysore and in British India.

The PRESIDENT also spoke.

The AUTHOR stated, in reply to Dr. EVANS, that small flakes of disseminated graphite occurred in several of the igneous rocks of Ceylon. He distinguished between the graphite occurring thus as a subordinate rock-forming mineral, and the vein graphite which had been deposited after the consolidation of the rocks in which it was found. In conclusion, he heartily thanked the Fellows for the very kind way in which they had received his paper.—*Mining Journal*, June 23.

* Paper read before the Geological Society of London.

PRODUCE AND PLANTING.

ARTFUL JAPANESE.—Japanese tea dealers, with the object of securing good prices, have been diligently spreading reports this season of a shortage of 15 to 20 per cent., in the first crop. It is now said to have been ascertained that the crop is fully up to the average, and even shows an excess as regards the yield of fine teas, considerable stocks of which are being held up-country. Adverse reports were also being circulated respecting the second picking, but here again it is positively asserted, in contradictions of these reports that the conditions have been extremely favourable to increased supplies this year, and that the third and fourth crops will also be abundant.

THE WORLD'S RUBBER SUPPLY.—The total world's supply of rubber today is about 120,000,000 to 130,000,000 lb, valued at about £15,000,000. At the present time lactiferous plants yielding "caoutchouc," or "rubber," are being worked for commercial purposes in Brazil, Bolivia, Central America, East and West Africa whence come the chief supplies, whilst Guiana, the Eastern Archipelago, Madagascar, India, and Ceylon contribute a small quantity to the general stock. More than half the total supply is exported from the Amazon district. Owing to the recuperative power of the tree it is improbable that the available supply of rubber from the Amazon valley will be exhausted in the near future. Also the enormous area over which the estates extend makes it unlikely that unexpected events should occur by which the industry as a whole would be damaged. For the same reason, and owing to the scarcity of labour. it is improbablo that any very sudden increase or decrease of the annual production will occur. The tendency is at present for a slight increase of the total production each year.—*H. and C. Mail*, July 13.

CACAO FERMENTATION.—A report as to experiments on the fermentation of cacao in Grenada forwarded by the Secretary of the Grenada Agricultural Society was referred to the Trinidad Cacao Committee with a view to local experiments of the same nature. They reported that there is no appreciable difference in the ultimate weight of cured cacao by reason of a short or long period of fermentation.—*Trinidad Agricultural Journal.*

ABOUT MALACCA TEA.

(By an Expert.)

I have been reminded about tea from Malacca tea having come into the market; and on tasting it, I find it most excellent tea, and able to hold its own alongside of Indian tea, at a smaller price. My knowledge of tea goes back to a very early period, having hobnobbed in 1863 with old C. A. Bruce who (in 1825) was the discoverer of the tea plant in Assam. He was charged by the old East India Company with starting the proper cultivation of the plant and manufacture of the leaf—the first efforts made to grow and make tea out of China, which has now spread all over India north and south, Ceylon, Natal, Java, the Fiji islands, and now to Malacca! He had a large staff of Chinese workmen placed under him imported from China; and many a story I could relate of his narrow escapes from the wild animals which then abounded in Assam, and from the wilder and more savage tribes who in those days made Upper Assam the scene of their predatory attempts. On one occasion—and this happened in Tezpur which he had made his headquarters and where he had his bungalow with his wife and children—while he was seated with his family having his evening tea, a wild elephant walked inside the house, carrying door-frames and all round his neck, crushing the frail mat walls, and putting every one to a speedy flight. When I add that tiger used to walk about the then newly-laid-out streets of Gowhatty, which afterwards became the capital of the province, it will be seen through what dangers Mr. Bruce and the early officials there had to go. However pleasant—for they were pleasant—early reminiscences of the early days of Assam and the first growth of tea outside China may be, I cannot linger on them.

I feel sure, and do not make the least doubt, that whoever has begun the tea industry in Malacca knows his work well and thoroughly. I say this from the excellent quality and flavour of "Malacca tea."—*Straits Times*, July 19.

RUBBER CULTURE IN COSTA RICA.

(From a London Merchant.)

You may be interested to hear that rubber is being freely cultivated in the Sarapiqui district and we are starting in the same direction. The Castilloa is a hardier plant than most rubber trees, needs very little weeding after the first year and grows like the jungle tree. Some say that there is no need to fell any of the jungle trees save only the undergrowth, a small distance round the new plant, but I think the sounder opinion is that a little felling is good, though certainly not to the extent that has been carried on in other countries. When Costa Rica is well opened up it will supply a substantial percentage of the world's rubber.

A BICENTENARY CELEBRATION.

The sweet pea is to have a bicentenary celebration of its own; there is to be a conference of a sweet pea growers in London, and an exhibition wholly devoted to specimens of this fragrant and beautiful flower. We can only say it deserves thoroughly all the honours which can be paid to it. The sweet pea is said by some to have been introduced to Britain from Sicily in 1700—hence the bicentenary of this month—but according to another version two varieties made their appearance about the same time, one from the sunny shores of the Mediterranean and the other from Ceylon, and were combined to form the flower as we have it now. It was in its original form of a modest bluish-purple, the exquisite varieties which are now to be found in our gardens having been gradually developed by the Horticulturist's Art; indeed, it may generally be said that, contrary to the common belief, no familiar flower has undergone so great a transformation. The sweet pea has not been much sung by poets, though Keats has an exquisite allusion to it as "on tip toe for a flight" in some of his earliest verses. No nation has taken it for its emblem; it has not ever had any political significance thrust upon it. But its delicious fragrance, its elegant and graceful form, and its adaptability to a great number of decorative purposes make it an immense favorite everywhere. Rich and poor cultivate it alike, and it is an absolutely essential denizen of those sweet old-fashioned gardens which so many talented pens have recently translated into literature for those not fortunate enough to possess them.—*Home Paper.*

JAMAICA PINEAPPLES.

Another shipment of pineapples from Jamaica has been put upon the market, and has again caused a stir in Covent Garden. They consisted of over 500 packages of fruits, and they were in very fine condition when they came to hand. This forms the second direct shipment into this country, the first parcel being sold at prices ranging from 1s 6d to 2s 6d per pine, and the first announcement of which was published in the *Globe* at the time. From an interview with one of the largest importers in the trade, it would seem that the direct trade in pineapples, between Jamaica and London, may now be considered as established on a business footing.—*Globe*, July 12.

RAINFALL RETURN FOR COLOMBO.

Supplied by the Surveyor-General.)

	1895.	1896.	1897.	1898.	1899.	Av of 30yrs.	1900.
	Inch.	Inch	Inch	Inch	Inch.	Inch.	Inch.
January ..	5·00	2·92	3·81	2·32	6·98	3·22	3·72
February ..	0·81	0·35	1·68	1·98	2·78	1·93	0·63
March ..	1·84	5·64	3·66	4·21	0·88	4·78	3·71
April ..	9·34	5·93	10·97	22·81	6·66	11·31	15·12
May ..	10·09	9·31	8·30	5·80	17·73	12·09	10·63
June ..	13·99	8·37	10·14	10·94	9·23	8·37	7·83
July	0·52	2·85	5·24	6·15	1·11	4·38	6·77
August ..	0·92	6·35	9·09	0·97	0·62	3·67	1·67*
September	4·09	10·99	4·58	6·90	1·48	5·01	
October ..	30·36	16·78	4·71	20·60	12 99	14·52	
November..	5·83	19.81	11·66	17·38	8·58	12 66	
December..	9·44	11·76	8·89	3-05	4·44	6·39	
Total..	92·23	101·06	82·73	103·11	73·48	88·33	50·08

* From 1st to 8th Aug. 1·67 inches, that is up to 9-30 a.m. on the 9th Aug.—Ed. *CO.*,

Ceylon Rainfall.

The P. W. D. Meteorological Observations for June 1900.—We append the Monthly Return of rain from which it will be seen that the highest fall in June, was at Padupola in the Central Province, 39·83 inches and the lowest at Vavuniya in the Northern Province, 0·02 inches.

Western Province.

Negombo, Mr. Bucknall (6) ... 3·43
Kalutara Mr. Gregson (36) .. 10·99
Labugama, Mr. Bond (369) ... 13·49
Henaratgoda, Mr. Silva (33) .. 8·67

Central Province.

Katugastota, Mr. Morgan (1,500) ... 6·4
New Valley, (Dikoya) Mr. Ward (3,700) .. 32·21
Helboda (Pussellawa) Mr. Anderson (3,300) .. 21·68
Yarrow Estate, Mr. Peiwick (3,400) 14·98
Peradeniya Mr. MacMillan (1,540) ... 11·07
Duckwari, Mr. Edwin (3,300) ... 9·47
Caledonia, Mr. Goork (4,273) .. 16·93
Pussellawa, Mr. Powell (3,000) .. 16·77
Hakgala, Mr. Nock (5,581) ... 9·52
S. Wanarajah Estate, Mr. Tatham (3,700) .. 30·79
Padupola, Mr. Ward .. (1,636) ... 39·83
Mylapitiya, Mr. Fletcher (1,707) ... 0·58

Northern Province.

Mullaittivu, Mr. Sanmukam (12) .. Nil
Jaffna Mr. Macdounel (8) 0·39
Mankulam, (N. Road) Mr. Walker (167) ... Nil
Elephant Pass, Mr Silva (7) .. Nil
Vangalachettykulam, Mr. Oorloff (179) .. Nil
Point Pedro, Mr. Chitampalam (24) ... 1·34
Jaffna College, Mr. Cooke (9) ... Nil
Kayts, Mr. Kretser .. (8) .. 0·89
Kankesanturai, Mr. Pararachasingha (10).. 0·14
Pallai, Mr. Silva (24) .. Nil
Murikandy, (North-Central Road) Mr. Silva (7) Nil
Nedunkeni, Mr. Sanmukam (122) ... Nil
Chavakachcheri, Mr. Silva (16) ... 0·20
Udupiddi, Mr. Brown (35) .. 1·06
Marichchukaddi, Mr. T. Pillay (14) 0·30
Murungan, Mr. Ramalinkam (52) 0·94
Vavuniya Mr. Walker (318) 0·02

Southern Province.

Ella Vella Mr. Caldicott (262) 20·73
Kekanadura, do (150) 22·64
Denagama, do (286) 18·00
Udukiriwila Mr. Lourensz (235) .. 10·49
Kirama, Not received (260) —
Hali-ela Mr. Caldicott (200) 18·45
Tissa Mr. Silva (75) .. 0·78
Matara Mr. Caldicott (15) 9·72
Dandeniya, do (175) 15·95

Urubokka, Mr. Caldicott (890) 23·86
Tangalla Mr. Fox (94) 4·58
Mamadola, Mr. Doole (56) .. 7·96

Eastern Province.

Irrakkamam, Mr. Bower (42) ... 0·80
Devilana, Mr. Vanderstraaten (136) Nil
Sagamata, Mr. Bower (40) ... 0·98
Ambare, do (65) 0·99
Kanthalai, Mr. Carte (150) 0·08
Allai, Mr. Carte (95) Nil
Rukam, Mr. Vanderstraaten (120) ... Nil
Periyakulam, Mr. Carte (20) ... Nil
Chadaiyautalawa, Mr. Edge (57) Nil
Kalmunai, do (12) Nil
Rotewewa, do (30) Nil
Lahugala, do (70) 0·50
Naulla, do (30) Nil
Audankulam, Mr. Carte (41) ... Nil
Manalpuddy, Mr. Vanderstraaten (21) Nil
Maha-Oya-Tank, Mr. Vanderstraaten (190) 1·72
Potuvil, Mr. Subramaniam — Nil

N.-W. Province.

Magalawewa, Mr. Gunaratna (176) .. 7·26
Maha Uswewa tank, Mr. Addams (160) ... 5·50
Tenepitiya, Mr. Churchill (8) ... 9·50
Batalagoda, Mr. Madahapola — 5·56

N.-C. Province.

Kalawewa, Mr. Emerson (268) 0·70
Maradankadawala, Mr. Emerson (443) ... 1·12
Mihintale, Mr. MacBride (354) .. Nil
Horowapotana, Mr. MacBride (217) .. Nil
Madawachchiya, Mr. MacBride (285) .. 0·20
Topare, Mr. Jayewardane (200) .. Nil
Minneriya Mr. Eves — Nil

Uva Province.

Bandarawela, Mr. Tocke (4,000) .. 0·65
Haldummulla, Mr. Viramuttu (3,160) .. 3·32
Kumbukan, Mr. Rowland (446) ... Nil
Koslanda, Mr. Rowland (2,258) ... 1·57
Tanamalwila, Mr. Silva (550) .. 1·95
Bibile, Mr. Silva (680) 0·25
Taldena, Mr. Fernando (1,100) ... 0·80
Alutnuwara—Mr. Leembruggen (600) 0·25

Sabaragamuwa.

Ambanpitiya, Mr. Dassanayaka (729) 13·13
Pelmadulla, Mr. Robertson (480) 37·12
Kolonna Korale (Hulanda-oya) Mr. Dabre (203) 2·86
Avisawella, Mr. Clarke (105) .. 18·89

S. G. O. Meteorological Observations for February, 1900.

The following is the return of the total fall of rain for February, from which it will be seen that the highest fall was at Maduwanwala, Rakwana 9·86 inches, and the lowest at Mannar and Hambantota 0·02 inches.

Colombo (40) 0·63
Ratnapura (84) 4·19
Puttalam (27) 0·22
Anuradhapura (295) 0·16
Mannar (12) 0·02
Jaffna (9) 0
Trincomalee (12) 0
Batticaloa (26) 1·18
Hambantota (50) 0·02
Galle (48) 3·49
Kandy (1,654) 0·77
Nuwara Eliya (6,188) 0·84
Hakgala, Nuwara Eliya (5,581) 0·97
Badulla (2,225) 1·08
Kurunegala (381) 0·23
Maligakanda, Colombo Mr. Johnson (70) 0·93
Agricultural School Colombo, Mr. Rodrigo 3·50
Passara Hospital, Passara (Mr. Thomasz) 2,200 3·10
Welhelmina, Puttalam, Mr. Ratnayeke (131) 0·13
Horakele Estate, Chilaw, Mr. Beven (50) 0·99
Chilaw Kachcheri Chilaw, Mr. Koch (10) 0·27
Franklands Estate — Veyangoda, Mr. Beven 0·94
Orange Hill, Ragama Mr. Bury (50) 1·21
Henaratgoda Gardens, Henaratgoda, Mr. de Silva (33) 1·16
Kotua Godella, Rambukana Mr. Windus (550) ..
Eadella or Liberia Estate Polgahawela Mr. Craighead (425) 1·50
Geekianakanda, Neboda Mr. Towgood (200) ..
Polgahakanda, Neboda Mr. Wight (300) ..
Labugama, Hanwella, Mr. Bond (369) 5·19
Bayigam, Horana, Mr. Dawson, (300) 4·79
Kanangma, Avissawella Mr. Cooke (200) 2·44
Dunedin Estate, Avissawella, Mr. Bayley, (400) 1·07
Digalla Avisawella, Mr. Tottenham, (400) 3·76
Pambagama, Avisawella, Mr. Bridgman (600) ..
Avisawella Estate Avisawella Mr. Byrde (250) ..
Yatideriya, Kegalla, Mr. Fairweather — 0·94
Mahawalatenna, Balangoda Mahawalatenna R. M. 4·18
Agarsland Estate Balangoda Mr. Boyd (2,215) ..
Maduwanwala, Rakwana, Maduwanwela R.M. (750) 9·86
Anninkanda, Morawaka, Mr. Anderson, (1,400) 8·05
Panilkanda, Morawaka, Mr. Davidson (1,900) 7·11
St. John Del Rey, Bogawantalawa Mr. Glanville (4,300) 4·22
Friedland, Bogawantalawa Mr. Rammell (5,200) ..
Campion, Bogawantalawa, Mr. Giddeu, (4,840) 3·72
Blair Athol, Dikoya, Mr. Lane (3,641) 2·51
Aunfield, Dikoya, Mr. Knight (4,300) 1·54
Maskeliya Hospital, Maskeliya Dr. Poulier (4,200) 0·35
Hope Estate, Hewaheta, Mr. Bagot (5,100) 1·55
Coldstream Estate, Watawala Mr. Spedding (3,800) 1·82
Holmwood Est., Agrapatana, Mr. Gray (5,240) 4·47

Sandringham, Agrapatana Mr. Orchard (5,200) ..
Gingran-oya, Kotmale, Mr. Cox (3,800) 2·36
Labookelle, Ramboda, Mr. Stone (5,000) 2·46
Dunsinane, Pundalu-oya, Mr. Metcalfe (4,800) 1·36
Sogama, Pussellawa, Mr. Eustace (3,500) 1·19
Kurundu-oya, Maturata, Mr. MacMahon (5,150) 3·58
Kabaragalla, Maturata, Mr. Maclean (4,400) 1·51
Maragalla Estate, Moopana, Mr. Betts, (2,200) 2·01
Mupana, Hospital, Mupana (Mr. Sela) (500) 1·49
Madulsima Hospital, Lunugala Dr. Vethecan (3,600) 0·56
Badulluwella Hospital, Badulluwella (450) 3·84
Meerlabedda, Haputale, Mr. Dupuis (3,600) 2·90
Udaheua Estate, Haputale, Mr. Bisset, (4,100) 5·44
Haputale Hospital Haputale Mr. VanReoyen (4800) 0·91
Post Office, Bandarawela, Mr. Mendis (4,035) 0·58
Callander, Ohiya Mr. Green (5,125) ...
Mariawatte, Gampola Mr. Salmoud (1,600) 0·48
Orwell Estate, Gampola Mr. Taylor (1,800) 0·62
New Forest, Deltota, Mr. Wardrop (3,500) 1·02
Rajawella, Estate, Telleniya Mr. Miller, (1,500) ...
Lower Spring Valley, Badulla Mr. Rettie (3,650) 0·63
Gourakele Estate, Badulla Mr. Hope (1,200) 0·90
Mousagala Estate, Badulla, Mr. Deaker (4,500) 1·39
Ledgerwatte, Badulla Mr. Rettie (4,000) 1·74
Hambegamuwa Tank, Badulla (RanbandaKorala)
Dea Ella Estate, M'wa atenna Mr. Vanderslott (800) 2·04
Pathugalla, Kegalla Mr. Sancti (550) 0·51
Sembawatte Estate, N'pitiya Mr. Jamieson (1,600) 1·40
Gammaduwa, Estate, Rattota Mr. Westland (2,400) 2·72
Kobonella Estate, Rangala, Mr. Pole (3,300) 4·14
St' Martins, Rangala, Mr. Ellis (3,600) 4·14
Crystal Hill, Matale, Mr. Van Starrex (1,400) 0·46
Vicarton Estate, Matale Mr. Carde (3,250) 0·15
Matale Mr. Tisseverasinghe (1,208) 0·32
Wariapolla, Matale, Mr. Dickenson (1,200) 0·28
Dambulla, Mr. Sinnatamby (400) 2·02
Kotta Estate, Pallai, Mr. Todd (13) ...
Mantota Hospital, Mannar, Mr. Adams (17) 1·25
Buttala Hospital, Buttala, Mr. Perera ... 0
Police Station, Hatton Police Constable Miskin (1,141) 1·10
Medway Estate Nilaveli, Mr. Abraham, .. 0
Delwita, Kurunegala Mr. Price (490) 0
Woodside, Uragalla Mr. MacMahon (3,000) 0·40
Gillardstown, Wattegama Mr. Hardy (2,500) 1·08
Ja ela Hospital, Ja-ela Mr. Fernando (4) 1·40
Maspana, Uda Pussellawa Mr. Jones (2,000) 2·29

SHARE LIST.

ISSUED BY THE

COLOMBO SHARE BROKERS' ASSOCIATION.

CEYLON PRODUCE COMPANIES.

Company	paid p. sh.	Buyers.	Sellers.	Transactions
Agra Ouvah Estates Co., Ltd.	500	900	—	900
Ceylon Tea and Coconut Estates	500	—	500	—
Castlereagh Tea Co., Ltd.	100	..	—	90
Ceylon Hills Estates Co. Ltd..	100	—	..	—
Ceylon Provincial Estates Co. Ltd.	500	—	—	500
Claremont Estates Co., Ltd.	100	—	—	—
Clunes Tea Co., Ltd.	100	80	—	—
Clyde Estates Co., Ltd.	100	40	—	—
Doomoo Tea Co., Ltd.	100	60	65	—
Drayton Estate Co., Ltd.	100	1.0	—	—
Eila Tea Co., of Ceylon, Ltd.	100	..	—	—
Estates Co., of Uva, Ltd.	500	—	225	225
Gangawatta	500	—	—	—
Glasgow Estate Co., Ltd.	500	935	—	—
Great Western Tea Co.,	500	600	—	—
Hapugahalande Tea Estate Co.	200	—	—	—
High Forests Estates Co., Ltd	500	520	—	—
Do part paid	350	—	—	—
Horekelly Estates Co., Ltd.	100	—	—	—
Kalutara Co., Ltd.	500	—	375	—
Kandyan Hills Co., Ltd.	100	—	—	—
Kanapediwatte Ltd.	100	85	—	—
Kelani Tea Garden Co., Ltd.	100	—	—	—
Kirklees Estates Co., Ltd.	100	—	120	—
Knavesmire Estates Co., Ltd.	100	—	70	—
Maha Uva Estates Co., Ltd	500	—	—	490
Mocha Tea Co., of Ceylon, Ltd.	500	615	—	—
Nahavilla Estate Co., Ltd.	500	—	400	—
Neboda Tea., Co. Ltd	500	—	500	—
Nyassaland Coffee Co. Ltd	100	—	—	—
Ottery Estate Co., Ltd.	100	—	—	—
Palmerston Tea Co., Ltd.	500		400	—
Penrhos Estates Co., Ltd.	100	100	—	100
Pine Hill Estate Co., Ltd.	60	—	42½	—
Pitakanda Tea Company	500	—	—	—
Putupaula Tea Co., Ltd.	100	—	—	—
Ratwatte Cocoa Co., Ltd.	500	—	—	—
Rayigam Tea Co. Ltd.	100	52½	—	—
Roeberry Tea Co., Ltd.	100	47½		—
Ruanwella Tea Co., Ltd.	100	—	40	—
St. Heliers Tea Co., Ltd.	500	510	—	—
Talgaswela Tea Co., Ltd.	100	—	—	..
Do 7 per cent Prefs.	100	—	..	—
Tonacombe Estate Co., Ltd.	500	—	450	—
Udabage Estate Co., Ltd.	100	—	..	—
Udugama Tea & Timber Co., Ltd.	50	—	..	—
Union Estate Co., Ltd.	500	.	...	—
Upper Maskellya Estate Co. Ltd.	500	—	450	...
Uvakellie Tea Co., of Ceylon, Ltd.	100	60	—	..
Vogan Tea Co., Ltd.	100	75	76	75
Wanarajah Tea Co., Ltd.	500	1100	..	..
Yataderiya Tea Co., Ltd.	10	...	375	..

Ceylon Commercial Companies

Company	paid p. sh.	Buyers.	Sellers.	Transactions
Adam's Peak Hotel Co., Ltd.	100	..	..	..
Bristol Hotel Co., Ltd.	100	110	115	110 xd
Do 7 per cent Debts	100	107·50	...	..
Ceylon Gen. Steam Navg'n Co., Ltd.	100	—	—	216
Colombo Apothecaries' Co. Ltd.	100	142·50	...	142·50
Colombo Assembly Rooms Co., Ltd.	20	12·50	..	...
Do prefs.	20	...	..	..
Colombo Fort Land and Building Co., Ltd.	100	85	—	90
Colombo Hotels Company	100	..	300 xd	—
Galle Face Hotel Co., Ltd.	100	..	—	145
Kandy Hotels Co., Ltd.	100	...	120	—
Kandy Stations Hotels Co.	100	..	30	...
Mount Lavinia Hotels Co., Ltd.	500	150	..	...
New Colombo Ice Co., Ltd.	100	175	180	..
Nuwara Eliya Hotels Co., Ltd.	100	...	30	...
Do 7 per cent prefs.	100	..	..	..
Public Hall Co., Ltd.	20	15	...	..
Petroleum Storage Co.	100	..	.	..
Do 10 % prefs.	100	...	...	..

LONDON COMPANIES.*

Company	paid p. sh.	Buyers.	Sellers.	Transactions
Alliance Tea Co., of Ceylon,	10	8½	9½—10	..
Anglo Ceylon General Estates Co.	100	..	35—45	..
Associated Estates Co., of Ceylon	10	..	3—4	...
Do. 6 per cent prefs.	10	..	0½—7½	..
Ceylon Proprietary Co.	1	...	⅝—⅞	..
Ceylon Tea Plantation Co., Ltd.	10	..	26—27	..
Dimbula Valley Co., Ltd.	5	..	5½—6	..
Do prefs.	5	..	..	...
Eastern Produce & Estates Co.	5	...	5½—5¾	...
Ederapolla Tea Co.,	10	...	8	...
Imperial Tea Estates Co., Ltd.	10	...	..	
Kelani Valley Tea Assn., Ltd.	5	..	5—6	...
Kintyre Estates Co., Ltd.	10	...	7—8	..
Lanka Plantation Co., Ltd.	10	4½	4—5	..
Nahalma Estates Co., Ltd.	1	-	½—¾	..
New Dimbula Co., Ltd.	1	...	2¾—3	..
Nuwara Eliya Tea Estate Co., Ld.	10	10	...	10
Ouvah Coffee Co., Ltd.	10	..	5—7	...
Ragalla Tea Estates Co., Ltd.	10	..	10	..
Scottish Ceylon Tea Co., Ltd.	10		13—15	...
Spring Valley Tea Co., Ltd.	10	3	4—5	..
Standard Tea Co., Ltd.	6	..	11—12	..
The Shell Transport and Trading Company, Ltd.	100	..	...	202
Yatiyantota Ceylon Tea Co., Ltd.	10	...	8—9	...
Do. pref. 6 o/o	10	...	9¾—10¼	..

BY ORDER OF THE COMMITTEE.

Colombo, August 10th, 1900.

*Latest London Prices.

THE LOCAL MARKET.

(By Mr. James Gibson, Baillie St., Fort.)

Colombo, Aug. 8th, 1900.

COFFEE:—	
Estate Parchment per bushel	R·800 to 10·50
Chetty do do	None offering.
Native Coffee per cwt.	None offering.
do F. O. B per cwt.	None offering.
Liberian coffee:—per bushel	None offering.
do cleaned coffee:—per cwt	None offering.
Cocoa unpicked:—per cwt	None offering.
do cleaned do	None offering.
Cardamoms Malabar per lb	R0·90 to 1·00
do Mysore do	R1·25 to 1·60
RICE:—	
Soolai per bag of 164 lb. nett	R9·12 to 9·50
Slate or 1st quality:—per bushel	R3·55 to 3·60
Soolai 2 & 3rd. do do	R3·48 to 3 53
Coast Calunda	R4·12 to 4·25
Coast Kara	R4 00 to 4·12
Kazala	R3·45 to 3·47
Muttusamba Ordinary	R5·37 to 6·00
Cinnamon per lb No 1 to 4	R00·52 to 00·53
do do 1 and 2	R00·60 to 00·62
do Chips per candy	R87·50
Coconuts Ordinary per thousand	R35·00 to 38·00
do Selected do	R36·00 to 39·00
Coconut Oil per cwt	R14·25 to 14·37½
do do F. O. B. per ton	R285·00 to 287·50
POONAC:—	
Gingelly per ton	R100·00 to 105·00
Coconut Chekku do	R80·00 to 85·00
do Mill (retail) do	R85·00
Cotton Seed per ton	R85·00 to 87·50
Copra per candy	
Kalpitiya do	R45·00 to 45·50
Marawilla do	R43·00 to 45·50
Cart Copra do	R37·00 to 43·00
Satinwood per cubic feet	R2·00 to 2·25
do Flowered do	R5·00 to 6·00
Halmilla do	R1·90
Palu do	R1·00 to 1·12
Ebony per ton	R75·00 to 175·00
Kitul fibre per cwt	R30·00 to 32·50
Palmyra do do	R8·00 to 14·50
Jaffna Black Cleaned per cwt	R14·50
do mixed do	R12·00 to 12·50
Indian do	R8·00 to 11·50
do Cleaned do	R10·00 to 14·50
Sapanwood per ton	R47·50 to 50·00
Kerosene oil, American per cases,	R7·00 to 7·25
do bulk Russian, per tin	R3·12 to 3·20
do Russian per cases	R6·80 to 6·85
Nux Vomica per cwt	R2·00 to 3·50
Croton Seed per cwt	R23·00 to 28·00
Kapok cleaned f o b per cwt	R24·00
do uncleaned do	R5·50
Plumbago per ton, according to grade — Large lumps	R400·00 to 750·00
Plumbago — Ordinary size lumps	R350·00 to 650·00
Plumbago — Chips	R200·00 to 500·00
Plumbago — Dust	R100·00 to 350·00

COLOMBO PRICE CURRENT.

(Furnished by the Chamber of Commerce.)

EXPORTS.

Colombo, 6th Aug. 1900.

Cardamoms:—
All round parcel, well bleached per lb. R1·50
Do. dull medium do. 1·25
Special assortment, 0 and 1 only do. 1·65
Seeds do. 1·35

Cinchona Bark:—
Per unit of Sulphate of Quinine 11c—1½ to 3 o/o

Cinnamon :—
Ordinary assortment per lb. 57c
Nos. 1 and 2 only per lb. 62c.
Nos. 3 and 4 only per lb. 53c.

Cinnamon Chips :—
Per candy of 560 lb R87·50

Cocoa :—
Finest estate red ; unpicked per cwt R48·00
Medium do do " 45·00
Bright native, unpicked and undried " ...
Ordinary do do do " ..

Coconuts—(husked).
Selected per thousand R48·00
Ordinary " R37·00
Smalls " R29·00

Coconut Cake—
Poonac in robins f. o. b. per ton R82·50
Do. in bags none.

Coconut (Desiccated).
Assorted all grades per lb. 13¾c

Coconut Oil—
Dealers' Oil per cwt. R14·37½—Small transactions.
Coconut Oil in ordinary packages, f. o. b. per ton R325·00

Coffee.—
Plantation Estate Parchment on the spot per bus. R10·50.
Plantation Estate Coffee f.o.b. (ready) per cwt.—None.
Native Coffee, f.o.b per cwt.—None.

Citronella Oil—
Ready do per lb. 65c.

Copra—
Boat Copra per candy of 560 lb. R45·50
Calpentyn Copra do do R45·50
Cart do do do R43·00
Estate do do do R45·50

Croton Seed per cwt R22·00

Ebony—
Sound per ton at Govt. depot R175.—As per last Govt. sales. Next sale 3rd September.
Inferior R120.—As per last Govt. sales. Next sale, 3rd September.

Fibres—
Coconut Bristle No 1 per cwt R10·50
Do " 2 " ...
Do mattress " 1 " 3·50
Do " 2 " 3·00
Coir Yarn, Kogalla " 1 to 8 18·00
Do Colombo " 1 to 8 16 00
Kitool all sizes 38·00
Palmyrah 16·00

Pepper—Black per lb 28c.

Plumbago—
Large lumps per ton R750
Ordinary lumps do 650
Chips do 500
Dust do 350
Do (Flying) 150

Sapanwood— per ton R52·50

Satinwood (ordinary) per cubic ft. R2·50

Tea—	High Grown Average.	Medium Average.	Low Grown Average.
Broken Pekoe and Broken Orange Pekoe per lb	cts 78	cts 52	cts 35
Orange Pekoe do	70	42	38
Pekoe do	52	39	33
Pekoe Souchong do	44	34	28
Pekoe Fannings do	41	30	24
Broken mixed—dust, &c. per lb	37	21	22

CEYLON EXPORTS AND DISTRIBUTION, 1899-1900.

COUNTRIES	Tea. 1900 lbs.	Tea. 1899 lbs.	Coffee—cwt. Plantation	Coffee—cwt. N'tive	Coffee—cwt. Total.	Cocoa cwts.	C'moms lbs.	Cinnamon. Bales lbs.	Cinnamon. Chips. lbs.
To U K. ..	72421731	62803137	3756	..	3756	16502	227376	44 022	184697
" Austria ..	11057	7338	..	..	..	..	..	1500	19600
" Belgium ...	6565	9983	54	..	54	417	...	28634	68100
" France ..	141686	69707	..	...	..	78	3407	71488	23484
" Germany ..	217996	256023	336	..	336	265	62970	257842	335174
" Holland ..	2000	12860	..	..	..	...	...	..	47040
" Italy ..	5007	8716	..	..	..	...	519	57100	63392
" Russia ..	5129695	1958690	128	..	128	..	..	..	...
" Spain ..	15130	11800	..	...	..	...	..	128500	25200
" Sweden ..	49118	35326	9	..	9	..	4051	2400	..
" Turkey ..	12843	11007	..	..	..	..	1060	...	10
" India ..	437638	299852	75	4	79	...	40140	500	..
" Australia ..	9339359	9311919	2006	..	2006	20	336	4220	129·6
" America ..	3000450	1597791	85	..	85	561	2201	189000	120400
" Africa ..	115028	190430	...	..	..	..	1456	100	2408
" China ..	874682	757113	24	...	24	82	1800	50000	...
" Singapore ..	60552	39567	1	..	1	675	1340	..	..
" Mauritius ..	700	33415	..	..	..	..	...	...	..
" Malta ..	251378	176552	..	...	..	..	..	..	.
Total export from 1st Jan. to 6th Aug 1900	92092615	77591226	6474	4	6478	18600	346596	1233306	902441

COUNTRIES	Coconut Oil. 1900 cwt	Coconut Oil. 1899 cwts	Copra cwts.	Desiccated Coconut lb.	Poonac cwts.	Coconuts No.	Plumbago. 1900 cwts.	Plumbago. 1899 cwts.	Fibre.	Ebony cwts.	Sapanwood cwts.
To U K. ..	1396·8	64671	13698	4378227	..	7456415	70450	100141	32218	280	6284
" Austria ..	5679	2064	17611	59870	...		2	14	...	..	1266
" Belgium ...	1025	606	52343	232114	45440	...	23656	22306	10747	.	..
" France ..	...		16094	3602	201	..	102	814	800	220	..
" Germany ..	7041	1412	38085	517166	41310	419869	32747	51844	8913	2045	2880
" Holland ..	..	..	..	110536	.	25050	912	5776	200	...	...
" Italy ..	..	404	1500	..	..	3018		.	..	45	...
" Russia ..	..	..	40321	..	...	1590	1004	1188	...	..	..
" Spain ..	..	..	..	...	...	..	..	...	..	..	..
" Sweden ..	...	206	4403	...	..	..	106	307	...	...	...
" Turkey ..	.	..	1	...	..	2000	...	..	..	...	...
" India ..	36098	36667	128	..	..	51950	800	336	120	..	23
" Australia ..	83	373	..	338049	..	..	1637	759	2353	27	.
" America ..	37499	62148	..	980715	...	..	94617	168959	5911	..	..
" Africa ..	...	..	..	22530	...	916155	..	..	1446	..	...
" China ..	827	2880	20	83555	...	..	41	100	...	..	...
" Singapore ..	1927	22333	..	...	..	—	...	..	42	...	..
" Mauritius ..	..	..	...	...	..	...	..	...	..	..	...
" Malta ..	...	...	...	..	..	..	..	..	..	..	...
Total export from 1st Jan. to 6th Aug 1900	229810	194061	184204	67 6358	80951	8880047	226073	352544	62260	2617	10453

MARKET RATES FOR OLD AND NEW PRODUCTS

(From Lewis & Peat's Fortnightly Prices Current, London, July 11th, 1900.)

	QUALITY.	QUOTATIONS.
ALOES, Soccotrine cwt.	Fair to fine dry ..	44s a 85s
Zanzibar & Hepatic ,,	Common to good ..	20s a 60s
ARROWROOT (Natal) lb.	Fair to fine ..	5½d a 6¼d
BEES' WAX, cwt.		
Zanzibar & Bombay White ,,	Good to fine	£6 a £7 10s
Zanzibar & Bombay Yellow ,,	Fair ,,	£6 10s a £7 [illegible]s 6d
Madagascar ,,	Dark to good palish	£6 5s a £6 17/6
CAMPHOR, China ,,	Fair average quality	187s 6d
Japan ,,	,, ,, ,,	192s 6d
CARDAMOMS, Malabar lb	Clipped, bold, bright, fine	2s 6d a 2s 9d
	Middling, stalky & lean	1s 5d a 1s 7d
Ceylon.—Mysore ,,	Fair to fine plump ..	1s 7d a 4s 2d
	Seeds .	2s a 2s [illegible]d
,, Tellicherry ,,	Good to fine ..	2s 11d a 3s
	Brownish ..	2s 6d
,, Long ,,	Shelly to good ..	2s 11d a 3s 6d
,, Mangalore ,,	Med brown to good bold	1s 10d a 3s 6d
CASTOR OIL, Calcutta ,,	1sts and 2nds ..	3¼d a 4¼d
CHILLIES, Zanzibar cwt.	Dull to fine bright ...	37s 6d a 47s 6d
CINCHONA BARK.— lb. Ceylon	Ledgeriana Orig. Stem	3¾d a 6¾d
	Crown, Renewed	5d a 7d
	Org. Stem	3¾d a 5½d
	Red Org. Stem	4⅜d a 5⅜d
	Renewed	5¾d a 7½d
	Root	3¼d a 4d
CINNAMON, Ceylon 1sts per lb	Ordinary to fine quill	11d a 1s 8d
2nds	,, ,,	10d a 1s 7d
3rds	,, ,,	9½d a 1s 6d
4ths	,, ,,	8½d a 11½d
Chips	,, ,,	3½d a 9d
CLOVES, Penang lb.	Dull to fine bright bold	5½d a 9d
Amboyna ..	Dull to fine	4½d a 5½d
Zanzibar and Pemba	Good and fine bright	3¾d a 4d
	Common dull to fair	3⅜d a 3½d
Stems ..	Fair	1½d
COFFEE		
Ceylon Plantation ,,	Bold to fine bold colory	100s a 115s
	Middling to fine mid .	85s a 95s
	Low mid. and low grown	75s a 82s 6d
	Smalls	55s a 75s
Native	Good ordinary	30s a 70s
Liberian ,,	Small to bold	37s a 45s
COCOA, Ceylon ,,	Bold to fine bold	90s a 100s
	Medium and fair	78s a 87s 6d
	Native	65s a 73s
COLOMBO ROOT ,,	Middling to good	12s a 20s
COIR ROPE, Ceylon ton		nominal
Cochin ,,	Ordinary to fair .	£14 a £19
FIBRE, Brush ,,	Ord. to fine long straight	£16 a £19
Cochin ,,	Ordinary to good clean	£18 a £24
Stuffing ,,	Common to fine	£7 a £9
COIR YARN, Ceylon ,,	Common to superior	£15 a £33
Cochin ,,	.. .. very fine	£12 a £32
do. ,,	Roping, fair to good	£10 a £14 10s
CROTON SEEDS, sift. cwt.	Dull to fair	30s a 40s
CUTCH ,, ,,	Fair to fine dry	23s a 35s
GINGER, Bengal, rough ,,	Fair	27s
Calicut, Cut A ,,	Good to fine bold	87s 6d a 92s 6d
B & C ,,	Small and medium	35s a 72s 6d
Cochin Rough ,,	Common to fine bold	25s a 33s
	Small and D's	25s a 28s
Japan ,,	Unsplit	24s
GUM AMMONIACUM ,,	Sm. blocky to fine clean	20s a 45s
ANIMI, Zanzibar ,,	Picked fine pale in sorts	£10 7s 6d a £20
	Part yellow and mixed	£8 2/6 a £10 10s
	Bean and Pea size ditto	70s a £9 2/6
	Amber and dk. red bold	£5 10s a £7 10s
	Med. & bold glassy sorts	80s a 100s
Madagascar ,,	Fair to good palish ...	£4 8s a £8
	.. ,, red ...	£4 5s a £9
ARABIC E. I. & Aden ,,	Ordinary to good pale	35s a 60s
Turkey sorts ,,		67s 6d a 85s
Ghatti ,,	Pickings to fine pale ...	12s 6d a 35s
Kurrachee ,,	Good and fine pale ...	52s 6d a 55s
	Reddish to pale selected	30s a 40s
Madras ,,	Dark to fine pale ...	23s a 35s
ASSAFŒTIDA ,,	Clean fr to gd. almonds	40s a 85s
	Ord. stony and blocky	8s a 25s
KINO ,,	Fine bright	1s a 1s 3d
MYRRH, picked ,,	Fair to fine pale	65s a 75s
Aden sorts ,,	Middling to good	33s a 55s
OLIBANUM, drop ,,	Good to fine white	35s 6d a 50s
	Middling to fair	25s a 35s
pickings ,,	Low to good pale	17s a 20s
siftings ,,	Slightly foul to fine	16s 6d a 18s
INDIARUBBER, Assam lb	Good to fine	2s 10½d a 3s 2¾d
	Common to foul & mxd.	1s 4d a 2s 6d
Rangoon	Fair to good clean ...	2s 3d a 3s 3d
Borneo	Common to fine	1s a 2s 4d

	QUALITY.	QUOTATIONS
INDIARUBBER, (Contd).		
Java, Sing. & Penang lb.	Foul to good clean ..	8d a 3s 3d
Mozambique ,,	Good to fine Ball ...	2s 8d a 3s 6d
	Ordinary to fair Ball..	2s a 2s 10¾d
	Low sandy Ball ..	1s 3d a 1s 7d
	Sausage, fair to good .	3s 2d a 3s 7d
	Liver and livery Ball	2s 4d a 3s 1½d
Nyassaland ..	Fair to fine ball	[illegible]s a 3s 4½d
Madagascar ,,	Fr to fine pinky & white	3s a 3s 3d
	Fair to good black ..	2s a 2s 10¾d
	Niggers, low to fine ..	11d a 2s 8d
INDIGO, E.I. ,,	Bengal—	
	Shipping mid to gd violet	3s 7d a 4s 6d
	Consuming mid. to gd.	3s a 3s 6d
	Ordinary to mid.	2s 9d a 3s 3d
	Mid. to good Kurpah	2s 4d a 3s
	Low to ordinary	2s a 2s 3d
	Mid. to good Madras	1s 7d a 2s 6d
MACE, Bombay & Penang per lb.	Pale reddish to fine	2s a 3s
	Ordinary to fair	1s 4d a 1s 11d
	Pickings	1s 4d a 1s 4½d
MYRABOLANS, Madras cwt	Dark to fine pale UG	6s a 7s
	Fair Coast	5s 6d a 6s
Bombay ,,	Jubblepore	4s 3d a 7s
	Bhimlies	4s 9d a 9s 6d
	Rhajpore, &c.	4s 3d a 8s
Bengal ,,	Calcutta	4s 6d a 6s
NUTMEGS— lb.	64's to 57's	2s 4d a 2s 6d
Bombay & Penang ,,	110's to 65's	11¼d a 2s 3d
	160's to 130's	6d a 11d
NUTS, ARECA cwt.	Ordinary to fair fresh	15s a 17s
NUX VOMICA, Bombay per cwt.	Ordinary to middling	4s a 5s 6d
Madras	Fair to good bold fresh	7s a 10s
	Small ordinary and fair	5s 6d
OIL OF ANISEED lb	Fair merchantable	6s 11d a 7s
CASSIA ,,	According to analysis	3s 8d a 4s
LEMONGRASS ,,	Good flavour & colour	[illegible]d
NUTMEG ,,	Dingy to white	3d a 3½d
CINNAMON ,,	Ordinary to fair sweet	3¼d a 1s 6d
CITRONELLE ,,	Bright & good flavour	11d a 1/0½d
ORCHELLA WEED—cwt		
Ceylon ,,	Mid. to fine not woody	10s a 12s 6d
Zanzibar. ,,	Picked clean flat leaf	10s a 16s
	,, wiry Mozambique	10s a 11s
PEPPER (Black) lb.		
Alleppee & Tellicherry	Fair to bold heavy ..	6½d a 6⅝
Singapore ..	Fair	6¼d a 6 5-16d
Acheen & W. C. Penang	Dull to fine	5½d a 6¼d
PLUMBAGO, lump cwt.	Fair to fine bright bold	40s a 45s
	Middling to good small	2[illegible]s a 35s
chips ,,	Dull to fine bright ..	10s a 20s
dust ,,	Ordinary to fine bright	4s a 11s
SAFFLOWER ,,	Good to fine pinky .	65s a 75s
	Inferior to fair .	40s a 60s
SANDAL WOOD—		
Bombay, Logs ton.	Fair to fine flavour ..	£20 a £50
Chips ,,	... ...	5s a £8
Madras, Logs ,,	Fair to good flavour ..	£20 a £50
Chips ,,	Inferior to fine ...	£4 a £8
SAPANWOOD Ceylon ,,	Fair to good .	£6 a £6 10s
Manila ,,	Rough & rooty to good	£4 10s a £5 15s
Siam ,,	bold smooth ...	£7
SEEDLAC cwt.	Ord. dusty to gd. soluble	53s a 59 s
SENNA, Tinnevelly lb.	Good to fine bold green	5d a 8d
	Fair middling medium	4d a 5¼d
	Common dark and small	1¼d a 3½d
SHELLS, M. o'PEARL—		
Bombay cwt.	Bold and A's; D's and B's; Small ...	£4 a £5 7s 6d
Mergui ,,	Small to bold ..	£5 15s a £9
Mussel ,,	Small to bold ...	18s a £3
TAMARINDS, Calcutta... per cwt.	Mid. to fine bl'k not stony	15s a 16s
Madras	Stony and inferior ..	7s 6d a 11s
TORTOISESHELL—		
Zanzibar & Bombay lb.	Small to bold dark mottle part heavy	19s a 26s 6d
TURMERIC, Bengal cwt.	Fair ...	36s nom.
Madras ,,	Finger fair to fine bold bright	25s a 27s 6d
Do. ,,	Bulbs ..	20s a 21s
Cochin ,,	Finger ..	24s
	Bulbs ...	7s 6d
VANILLOES— lb.		
Mauritius ... 1sts	Gd. crysallized 3½ a 9 in	17s 6d a 27s
Bourbon ... 2nds	Foxy & reddish 4½ a 8 ,,	15s a 22s
Seychelles 3rds	Lean and inferior ...	10s a 13s 6d
VERMILION lb.	Fine, pure, bright ...	3s 6d
WAX, Japan, squares cwt	Good white hard ,,,	32s 6d a 33s

THE

AGRICULTURAL MAGAZINE,

COLOMBO.

Added as a Supplement Monthly to the "TROPICAL AGRICULTURIST."

The following pages include the Contents of the *Agricultural Magazine* for August:—

Vol. XII.] AUGUST, 1900. [No. 2.

OCCASIONAL NOTES.

AMONG the more interesting contributions to the latest number of the Royal Agricultural Society's Journal (issued June 30th) are the following:—Fumigation for Insect Pests by William E. Bear; The Comparative Value of Nitrate of Sodium and Sulphate of Ammonium as Manures, by Pro. R. Warrington, M.A., F.R.S.; Experiments on Lucerne by Bernard Dyer, D.Sc. We reproduce elsewhere a note on Artificial Changes of Physical Properties of Soils.

We find that we have omitted to refer to a useful Circular issued from the Royal Botanic Gardens, drawn up by Mr. H. MacMillan, the Curator of the Gardens. This Circular deals with fruit trees suitable for cultivation in the low-country and for moderate elevations. It contains general directions regarding planting, propagation, &c., in addition to a list of fruit trees with short notes on each. In a Circular of this nature one does not expect to find a treatise on fruit cultivation, but to those who would desire to have fuller instruction regarding the cultivation of fruit trees we would commend a handy but most instructive publication issued by the Agricultural Department of the Cape of Good Hope, the authors of which are Messrs. P. MacOwan, F.L.S., Colonial Botanist, and Eutace Pillo- Agricultural Assistant. It is entitled a "Manual of Practical Orchard Work," and the general instructions on the subject are well worth the study of local fruit growers.

We direct attention to still another scheme that has been put forward by a practical hand for the agricultural education of the people of the country. There are many excellent suggestions in it, which deserve the attention of those who have been entrusted with the duty of reorganising the system of Agricultural Education in the Island. Of schemes there have been enough put forward already, and it is for the wise heads concerned with the settlement of the question at issue to sift all these and make out a policy acceptable to the Government and calculated to serve the agricultural interests of the native communities.

The fifth and last volume of Dr. Trimen's Flora has just come to hand, though it has been issued some little time now. This volume is principally taken up with the grasses (Graminœe), but it contains as appendices a key to the Orders Genera and Aberant species of Ceylon Flowering Plants, Diagnostic characters of the orders to which the Flowering Plants of Ceylon belong, a paper on the Forests and Waste Lands of Ceylon by Mr. A. F. Broun, Conservator of Forests. A paper on the Distribution of Rainfall in Ceylon by Mr. F. Lewis of the Forest Department. A History of

Ceylon Botany by Mr. G. S. Boulger F.L.S., of the City of London College, Additions and Corrections, Indices of Botanical, English and Nativel names.

We have just received a useful little pamphlet, issued as a Circular from the Royal Botanic Gardens, Peradeniya, dealing with the trees suitable for shade, wind-belts, timber and fue reserves, &c.

CLINICAL NOTES.

Two successful Cases of High Neurotomy (Bracheal).

I performed this operation on the first occasion in December, 1899, on a gharry horse with pegged splints. In this case the animal was operated on under chloroform and the healing was rapid, and the animal was able to be used after three weeks. In the second instance the operation was performed on a horse for ring bones. I prefer this to the ordinary medium or low neurotomy. The operation was performed without chloroform as the patient was very weak. The healing was tardy, yet the animal went alright after three weeks.

Incision of a section of the lateral tendon of the extensor metatarsi.

Two cases of bad spvain were brought for treatment, and these were operated on without chloroform, and the wounds were left opened after the dissection of the tendon. One animal soon after the operation did not show any lameness, and walked pretty will, improving very much in course of time. This animal is now working. The other had to be lifted up after the operation, but it improved after the healing was completed.

Amputation of the Penis in a Bullock.

A bullock was brought with the history that the animal had suffered from a bull-burnt condition of the organ, that a native doctor had advised the client to keep the animal in a pond covering the inflamed organ, that the animal was bitten by a crab, and that putrefaction of the organ continued as an effect of the bite. When the animal was thrown down for operation I had to slit open the whole sheath, and found at last that the penis had to be amputated. Another opening was made about two inches from the scrotoum as the organ was too short for the natural prepuce. The healing was on the whole satisfactory, and I have seen the animal after six months in good working order, and the artificial prepuce doing the duty of a natural one.

D. A. Chinniah,
Veterinary Surgeon.

PRACTICAL HINTS TO HORSE-OWNERS

By A. Chinniah, G.B.V.C.

Chapter II. (*contd.*)—Food and Feeding.

Groundnuts or Earthnuts (*Arachis Hypogœa*) belongs to the natural order legumnioseæ, and as may be expected it is highly nitrogenous. Another important property of groundnuts is that they are equally rich in hydrocarbonatious matter. The seeds are not in use as a horse food, but I am referring to them in connection with my previous remarks when writing about paddy, viz., that if some oleaginal ingredient were mixed with paddy and gram, the mixture should form a standard horse food. Further, it has been found that groundnuts like codliver oil are a specific in some forms of chronic pulmonary disease. Asthma, or broken wind of the horse, is caused pathologists find, by chronic indigestion. This incurable complaint is very common in horses and vulgarly spoken of as "panting" in Ceylon.

Groundnuts are grown in Southern India to a very great extent, and exported to Marseilles for the extraction of oil, by a process kept secret by the French manufacturers. The plant grows fairly well in Ceylon. Groundnut cake is used for feeding dairy cattle in Europe.

Grasses—Grass either dry or green, as I have already remarked, is the food of the herbevera in a state of naturl. In Ceylon only rice stalks are used in a dry state for feeding cattle. For horses it is only of value as bedding in the stable.

Hay is never made here, but it is imported from Australia. It is far more nutritious than straw, for the reason that before the stalks are fully matured, this is cut and turned into hay, and in this process only loose moisture, whereas in the case of straw, the seeds of which are used as horse food, there is very little nutriment left. In Ceylon we do not find the wild grass which grows in the rainy season in India, and which is generally turned into hay; hence the process of hay-making as carried on in India need not be described, but would repeat that good hay ranks as a standard fodder food for horses. In Ceylon hay is so expensive that it can only be used along with other concentrated foods with the object of ensuring proper mastication. On the other hand there are some good natural grasses to take the place of hay.

The Hariali or Dhub grass)known in Tami as 'Arugam pillu,') is botanically named Cynodonl dactylon. This is a sacred grass of the Hindus and it is largely used for feeding milch cows. Its roots and stems are succulent and the woody fibre is easily digested. The grass is so delicate and succulent that horses and cattle relish it highly. It may be said to grow on all soils, and unlike many other grasses it has numerous creeping stems. Another advantage of this grass is that the rootlets are fine and short, springing generally at each node, and hence it can be easily pulled out of the ground and easily got from sand and earth sticking to the roots. I may in this connection remark that it is important that ordinary wild grass as supplied to horses should be free from earthy matter, which when it enters the stomach cause uternal irritation and result in colic.

APICULTURE AT THE SCHOOL OF AGRICULTURE.

Mr. Chas. Andree, the experienced bee-keeper, visited the school at the request of the Superintendent of the institution, with the sanction of the Director, to report on the progress of the experiment in apiculture.

Mr. Andree examined the hives on the 25th July, in the presence of the students, and found two strong swarms at work, but the combs, he unfortunately found, were being irregularly built, and as a result the attempt to manipulate the frames caused injury to the bees and infuriated them. Mr. Andree advised that the hives with irregularly built combs (due to the frames not having been arranged equi-distantly) should be left alone, and fitted with a "super" to induce the bees to build in it. With Mr. Andree's help a convenient super was placed on the hive and we await results. As regards the bees themselves, Mr. Andree described them as a wild tribe of the Apis Indica, and thought that they would prove a constant source of trouble. These bees as we have previously stated were captured at Cotta. In order to facilitate matters, Mr. Andree has kindly promsied to secure one or two swarms of the less belligerent type of bee and send them here from Kurunegala. On the 26th Mr. Andree supervised the building of two hives on the premises. These hives will be probably sent to Kurunegala to be stocked and brought down. The hives on transverse section measure 16 inches square and have a depth of 9 inches. On two sides are frames (which might be made of jak or halmilla wood) into which a glass is fitted, with a wooden shutter over it. The rest of the hive may be made of deal-wood. The wood forming each of the eleven parallel frames within the hive is one-third of an inch thick and seven-eighths of an inch wide. The frames move freely on two rests made of zinc, but are kept at a distance of quarter of an inch apart by means of small nails. The frames as they are arranged in the box should have a space of quarter of an inch between them and the bottom top and sides of the hive. The bars of the frames should run parallel with the side having the glass window. In the new hives Mr. Andree has adopted a new arrangement for the bee hole. Instead of the old single hole 5 inches long and five-eighths of an inch in width, he has provided for two bee holes one above the other, each only quarter of an inch wide. This is intended to keep off the Sphnix atropus or Death's head moth which is the chief enemy to be guarded against. Mr. Andree has had hives full of combs destroyed in a few days by this moth. As soon as the new hives are stocked we intend, as advised by Mr. Andree, to reserve the bee house for these only, and remove the two hives containing the wilder type of bee now at work to some remoter position. This will leave the tame bees undisturbed.

SOME BIBLE PLANTS OF CEYLON.

III. The Mustard Tree.

There has been much discussion as to the identity of the mustard tree (referred to as Sinapi in the Gospels) of which St. Matthew speaks in chapter iii. 31 and 32 of his Gospel: "The kingdom of heaven is like to a grain of mustard-seed which a man took and sowed in his field; which indeed is the least of all seeds: but when it is grown it is the greatest among herbs, and becometh a tree, so that the birds of the air come and lodge in the branches thereof." Again, St. Mark describes it as a tree "shooting out great branches; so that the fowls of the air lodge under the shadow of it." (Mark iv. 31.) St. Luke also speaks of the tree in chapter xiii. 19, likening the kingdom of God "to a grain of mustard-seed which a man took and cast into his garden; and it grew and waxed a great tree; and the birds of the air lodged in the branches of it."

Our Lord also refers to the smallness of the seed in Matt. xvii. 20, and Luke xvii. 6.

The mustard was then a branching tree with small seed, and could not possibly be identical with the small annual herb which produces the mustard of commerce. Dr. Royle after careful examination of the subject has found that the mustard plant of Palestine at the present day answers in every respect to the description of the sacred writers. The tree grows near Jerusalem, on the banks of the Jordan and round the sea of Tiberias. The seed is called Chardal or Khardal, the Arabic, for mustard. The tree is known to botanists as *Salvadora persica* and belongs to the order Salvadoraceae, which is considered nearly allied to the Olive family (Oleaceae). It is found in Persia, Arabia, Palestine, N. Africa, India and Ceylon. The branches of Salvadora are very numerous and spreading, with their extremities pendulous like the weeping willow. The flowers are minute; the berries smaller than a grain of pepper, smooth and red. Each fruit contains one seed which is pungent and used like mustard. The fruit has an aromatic smell, the root bark is acrid and used as a vesicant. The shoots and leaves are eaten as salad, and are also used as camel fodder. The fruit is used medicinally in various ways, and an oil is extracted from the seed. The tree is sometimes referred to as the "tooth-brush tree" from its Persian name; the wood being largely used for making tooth brushes which are supposed by the natives to strengthen the gums and to improve digestion. The wood is described as white, soft and easy to work, taking a good polish, while white ants are not liable to attack it. Weight of wood about 46 lbs. to the c. foot.

Trimen, in his Flora, says that it is found in the desert and dry regions of the Island, especially by the coast. Gardner, who evidently first collected it, makes mention in his report for 1845-6, of the large trees he met with at Elephant Pass in the Northern Province. The generic name commemorates J. Salavador, a Spanish botanist. The Tamil names for the tree are Uvay and Viyay.

There are some, however, who still incline towards the belief that it is the black mustard plant (*Sinapis nigra*) that is referred to in Scripture, pointing to the fact that this herb is found in the holy land growing as high as a horse and his rider. The following extract supports this view:

Professor Hackett tells us that crossing the plain of Akka, in Palestine, he saw before him a little grove of trees. On coming near they proved to be a grove of mustard plants. Some of the trees were full nine feet high, with a trunk two or three feet in circumference, throwing out branches on every side. He wandered whether they were strong enough for the birds to "lodge in the branches thereof." Just then a bird stopped in its flight, alighted on one of the limbs, which hardly moved beneath the weight, and began to warble forth a strain of sweet music. His "doubts were charmed away," the "least of the seeds" had actually grown into a substantial tree."

AGRICULTURAL EDUCATION.

1. Agricultural education, both theoretical and practical, should be entirely in the hands of the Department of Public Instruction. An Agricultural Department should have its own work, in assisting the agriculturist with necessary advise; the scientific Botanical department will undertake investigations and experiments and work on purely scientific lines. Where the three branches are separated more work and much better work will naturally result. In India and elsewhere, the Agricultural Department undertake general work in assisting the cultivator, the Botanical department carries on investigations, and the Educational Department undertake instruction.

2. Much benefit would arise by the establishment of a central Agricultural School on a vernacular basis as suggested by Mr. Elliott in his paper. This school should be a thoroughly equipped one, and instructions should be given there on all branches of science &c. allied to agriculture.

3. The course of studies in the school should comprise three branches:—

(*a*.) General education.
(*b*.) Sciences, bearing on agriculture.
(*c*.) Practical training.

4. As suggested by Mr. Elliott all the training, lodging and board should be provided free. Boys admitted to the school should be drawn from among the following:—

(*a*.) For training as certificated teachers for vernacular schools, the present training schools to be done away with.
(*b*.) For training such students as are nominated by Government Agents.
(*c*.) And a limited number who seek admission on their own account.

5. All students for admission should be between the ages of 15 and 18, should have passed the VII. Standard Government Examination, or should pass an Entrance test.

6. To start with, there should be abou admissions for training as teachers under the same conditions under which training students are now admitted.

Fifteen students should be nomiuated by Government Agents. Their selection should be entirely left in the hands of the revenue officers without imposing any conditions whatever, except those of age and preliminary educational qualification.

There are many young men in the agricultural villages who aspire to become the headman of the village, and who are wholly engaged in agricultural pursuits. Very often they are the sons of the older headmen, and they succeed to the place on the retirement of their fathers. These young men will without hesitation offer themselves as to be trained at the school, were the revenue officers to nominate them for headmanship conditionally.

Five students should be admitted annually after a competitive examination. These, when trained, will be available for service under landed proprietors, or as overseers of experimental gardens which Government Agents (as an Agricultural Department) will establish.

7. The course of studies at the Agricultural School should extend over at least two and a half years. Each year should be divided nto two terms, as the present departmentali holidays will not suit an agricultural class, which should be expected to be in training at sowing and harvesting seasons. Of the five terms thus available, more than one term or six months should be devoted to practical work.

8. The curriculum of general education should be of the same standard as that of the training schools.

The teaching of science should always cousist of an equal number of practical lessons and lectures on each subject: the following subjects among others should be taken up:—

(*a*.)	Agricultural Science	36 lessons	each term.
(*b*.)	Botany	36 ,,	whole course.
(*c*.)	Chemistry	36 ,,	,, ,,
(*d*.)	Physiology	36 ,,	,, ,,
(*e*.)	Sanitation	36 ,,	,, ,,
(*f*.)	Veterinary	36 ,,	,, ,,
(*g*.)	1st aid (medical)	25 ,,	,, ,,
(*h*.)	Agricultural law	25 ,,	,, ,,
(*i*.)	Drawing	36 ,,	each term.
(*j*.)	Mensuration	36 ,,	whole course.

Practical Instruction.

(*a*.) Field.
(*b*.) Travelling.
(*c*.) Workshop.

There should be land worked in connection with the school of about fifty acres, say somewhere in the Kalutara district. This land should be used not so much as an experimental or a model farm, but primarily as a "workshop" to familiarise the students with the various operations of cultivation, harvesting, &c., drawing, levelling, irrigation, ploughing, roadmaking, lining, holing, and numerous other practical details of agricultural work which should be practised

here, and a number of students regularly told off to the farm for a month's work at a time.

After a practical acquaintance with the processes of cultivation has been established, a similar knowledge of crops should be gained on estates and gardens in an actual state of work, instead of through model farms. Travelling tours should be arranged for twice a year, and within the two and a half years' course a student should have travelled in all the important districts of the Island. In this travelling course he should make prolonged acquaintance with such cultivations as paddy, coconut, cacao, cardamoms, cinnamon, tobacco, tea, coffee, rubber, &c., and spend a number of days or weeks at selected estates. For instance, Mr. Elliott's Wallaway lands should keep a class for a two weeks to a month at work, and in the same way any coconut planter in the Veyangoda, Negombo, or Kurunegala district will welcome the travelling class to any coconut estate, while the same may be said of tobacco and other crops as well as garden products.

Workshop.—The students should acquire a knowledge of carpentry, blacksmith's work and building, sufficient for agricultural purposes. Their hands should be practised to the use of carpenters', smiths' and builders' tools, each of these branches being taken up at a different school term.

9. In the case of students who are being trained as teachers, a part of the practical work can be dispensed with and the time gained devoted to practical work in connection with the teaching profession.

10. It must be understood that no results should be expected, nor any attempt made to guage the extent of improvement resulting in the state of agriculture after a course of education as described above. All improvements should be gradual, and to force such will be unnatural and will never result in any practical good. I do not approve of experimental gardens in connection with agricultural education. It is for an Agricultural Department, or the revenue officer of the different districts to establish such gardens only in places where they think they are required.

11. There is one thing more the department of Public Instruction should do. They should not be satisfied with the mere establishment of a School of Agriculture, but the scope of such education should be extended and systematized.

A special grant should be given to all teachers of schools who train their boys for a practical course of agriculture in addition to the theoretical one now prescribed. A grant of Rs. 4 per head for first stage, Rs. 6 for second stage, and R8 for a third stage pass will be sufficient encouragement for teachers to attend to this matter. A syllabus should be drawn up, and the Agricultural Inspector appointed by the department should not only inspect the boys in their practical work, but should visit schools in different centres and organize this practical course as well as the establishment of school gardens. The Inspector in charge of agriculture or the agricultural assistant to the D.P.I. should, in addition, advise the department in connection with the central school of agriculture in all matters and take charge of some of the important travelling classes when he can find the time to do so.

12. The annual expenses for carrying out this scheme will not be much over R30,000. Of this R20,000 will include all expenses for the Agricultural School and R10,000, for providing the cost of an agricultural assistant to the Director, (who should at least be paid R5,000 a year,) and for payment of bonus on results to school teachers.

W. A. D. S.

Colombo, 28th June, 1900.

BY HIGHWAYS AND HEDGES.

The Chief Justice of Ceylon's Judgment in the *lagium* case affords amusing reading. For the benefit of the uninitiated I quote as follows from Dr. Watt:—"There are primarily three forms of the resin or narcotic (from Indian Hemp or *Canabis Sativa*), but under each there exists local modifications, special preparations from these and adulterations or imitations. The three forms are known as Ganja, Charas and Bhang. Ganja is the female flowering tops with the resinous exudations on these; Charas the resinous substance found on the leaves, young twigs, bark of the stem, and even the young fruits; Bhang, the mature leaves, and in some parts of India the fruits also, but not the twigs.

The definition of ganja as given in the local Ordinance is not a satisfactory one and does not go far enough. It would be better if all narcotic preparations from Cannabis Sativa were brought within the meaning of the Ordinance, since, as Dr. Watt informs us "from the stem, leaves, flowers, and even the fruits, a resinous extract of a powerful narcotic character may be prepared." So that it is not only the "diseased flowering tops" referred to by the Chief Justice that are capable of producing the objectionable drug.

The following further reference by Watt to these narcotics and the control of their use in India is also interesting:—"As already explained there are three forms of this poisonous drug: (*a*) ganja, the agglutinated female flowering tops and resinous exudation on these; (*b*) charas, a resinous substance found on the leaves, young twigs, and bark, and (*c*) bhang or siddhi, the mature leaves, and in some parts of India the fruits also, and even the very young twigs, but not the stems. Ganja and charas are smoked, and bhang is either used in the preparation of the green intoxicating beverage hashish, or in the manufacture of the sweet-meat known as majun (vulgarly majum). Bhang is much weaker than either ganja or charas, and by many is supposed to be much less injurious. It is sold in Bengal at from 4 to 8 or 12 annas a seer, whereas ganja and charas cost from R4 to R25 a seer. Bhang, being collected largely from the wild plant, is extensively used

all over India, the bulk of the consumption entirely escaping duty. This is mainly due to the fact that it would be impracticable to hold a man responsible for the existence of a wild plant growing within a certain radius of his hut, and it would be impossible to prohibit him gathering, from such a plant, and this daily quantity used by himself and family. This is precisely the state of affairs which prevails over a great part of India, and, indeed, on the lower slopes of the Himalaya and up to an altitude of 8,000 feet, the plant is often so plentiful as to be extensively used as bedding for cattle. The greatest difficulty exists, therefore, in regulating the consumption of bhang, but practically no such difficulty exists with regard to ganja and charas. The last mentioned narcotics can be produced only from the cultivated plant, and the consumption can therefore be regulated by law. The Excise Act provides that licensed persons may cultivate the plant, prepare the narcotics, and retail these to the consumer. The right to vend is sold by public auction, a person purchasing thereby the sole right, for one year, to all or so many of their shops in a district. Any person other than a licensed dealer, having in his possession more than a very small quantity at one time is liable to prosecution and fine. This system of farming the wholesale and retail shops exists all over India, Madras being an exception to the rule, since in South India no revenue whatever is credited to Government from these drugs.

Specimens of the fruit and leaves of a tree were sent to me early this month with an enquiry as to the use to which the parts of the tree could be put. The tree was kindly identified by the Curator of the Royal Botanical Gardens as *Polyalthia Coffecides*, known in Sinhalese as Omara and in Tamil as Nedunnarai. It is described by Trimen as an inhabitant of the dry low country forests, but extending up to 1,500 ft. It is found occurring near Kandy at Haragama and Anuradhapura. The flowers are borne from January to March and are apple-green in colour. The leaves which are shining and undulate are very characteristic, and resemble those of the coffee tree. The tree belongs to the Anona family and is rather ornamental in appearance, being hence found planted to some extent in gardens and on roadsides. The only use to which the tree is put appears to be for fibre got from the bark. Another species known as *P. langifolia* is useful in many ways to the people of India, according o Dr. Watt.

A correspondent from Matara writes:—"I send you a shrub used largely in this part of the country in dying rushes, of which mats are made, and called Welikaha. The leaf when boiled with sapan wood produces a bright red colour. Bombu or Bombi, as you know, is a timber tree which produces a bright orange colour. The leaf is mixed with matured jakwood to extract the dye which our Buddhist priests steep their robes in. Is it Symplocos speciosa, Roxb? Both the above trees grow wild but I venture to think the produce will be found marketable if only made known in Europe."

Welikaha is *Memecylon capitellatum.* (L.) (Melastomaceæ). It is also known among the Sinhalese as Dodankaha. Dr. Trimen speaks of the tree as one of the best marked species of memecylon, and easily recognized by the leaves alone. The wood is said to be hard and strong. As regard its use in dying, Trimen says that the leaves turn orange-yellow when dried and afford a yellow dye. I have observed the leaves being dried in the sun on mats near Amblangoda. This is one of the dyes mentioned in the enquiry regarding the dyeing of materials used for making baskets, mats and hats, and the possibility of improving native methods of dyeing, a matter which is receiving the attention of the Ceylon Delegate at the Paris Exhibition.

Referring to the dye of *M. capitellaltum* and other species, Dr. Watt has the following:— The leaves are employed in South India for dyeing a "delicate yellow lake." In conjunction with myrobolans and sapan-wood, they produce a deep red tinge much used for dyeing grass mats, and also good for cloth. Samples experimented with by Mr. Wardle give "a yellow colour to wool, eri silk, and bleached Indian tasar with a tin mordant, wool being dyed the deepest colour." Mr. Wardle writes: "They possess scarcely any tamin; on tasar silk without a mordant, they give a nice clear but light brown colour. There is a pretty yellow tinge on the eri silk." In another passage he adds: "This dye-stuff produces good light colours, but would not be of much use in the dye-house, owing to the very small amount of colouring matter it contains." The flowers are employed by native dyers as an adjunct to chay-root for bringing out the colour in preference to alum. By themselves they produce evanescent yellow. *Symplocos spicata*, referred to by my Matara correspondent is Bombu or wal bambu. I have not heard it also called "Bombi" which is the native name of *Litsea chinensis.* The fomer belongs to Styraceæ and the latter to Lauraceæ (the cinnamom family). The wood is described by Dr. Trimen as light, white and close-grained, but liable to split, and the bark is said to afford a dye. Ferguson iu his "Timber Trees" speaks of Bombu as a common tree from the coast up to 7000 ft. It is said to be a very conspicuous object when covered with its snow-white flowers. I am obliged to my correspondent for the information with reference to the use of Bombu with jakwood dye in colouring the robes of the priests of Buddha.

I have been lately struck by the tendency of much divided leaves to revert to the simple type. My observations have been limited to the leaves of a plant belonging to Araceæ which is normally much divided and consisting of as many as eight distinct segments, but which I find in various stages of reversion to the simple cordate type so common among the araceæ.

I have a few cocoa trees in my garden bearing fruit. On a tree in the same garden

I lately found a clay structure such as wasps and similar insects build, on another tree in the same garden shaped and coloured like a cocoa pod. Could this be a case of mimicry.

Mr. Weerakoon, Mudaliyar of Wellaboda Pattu, Southern Province, refers to the tendency in the paddy plant to yield no regular ear of corn, the plant being then called Beragas or Borupan (Anglice: false rush). "I have" he says "seen large patches containing such abnormal growths in the Morowak Korale and Wellaboda Pattu, sometimes 50% of the plants consisting of the "false rush." I attribute the result to inferior grain being used for sowing." The writer then goes on to ask if it could not be advisable to infuse "fresh blood" into paddy by importing a good quantity of seed paddy from India. This is what we have advised time without number, and we have imported seed from India and elsewhere on our own account in a small way. It is for Government to take it upon a large scale, and the improvement of seed in this way should form one of the duties of the reorganised School of Agriculture.

The same correspondent sends a note on "Kadupahara" which he describes as a perennial plant found growing wild in most places, but thriving luxuriantly in the up-country districts. The name is said to be derived from the ground-shaped leaves. The leaves, says our correspondent, when chopped up and prepared as a dry curry, makes a palatable dish, though the Sinhalese only use it as a vermifuge for calves. Mr. Nock, of Hakgala, is stated to have identified it as the "sow thistle," cultivated in some countries for the purpose of feeding pigs. Mr. Weerakoon recommends it as a desirable addition to our list of edible leaves. Dr. Trimen in his Flora mentions that *Sorchus asper* and *S. oleracens*, the common sow thistles of England, are commonly found as weed in cultivated ground.

ARTIFICIAL CHANGES OF PHYSICAL PROPERTIES OF SOIL.

In this paper the author considers what practical means may be employed to impart to cultivated soils the greatest possible productiveness. That the proper cultivation of the soil is of prime importance is shown by the fact that other factors important in plant growth, *e.g.*, the plant food supplied by manures, can exert their full power only when the mechanical condition of the soil is favourable. Uncultivated soils generally fail to produce maximum yields. The most favourable physical conditions exist in those soils which consist of a thorough mixture of the several principal ingredients. Thus soils in which either finely-divided (clayey) or coarsely-divided (sandy) ingredients predominate are unfavourable to the production of crops without decided changes in their properties, while soils in which the ingredients are mixed in certain proportions (medium soils) are generally productive. It is well known, for instance, that a pure humus soil, mainly on account of its physical nature, is not favourable to plant growth, but may be rendered productive by admixture with a soil deficient in humus.

It is evident that in studying the various ways of cultivating soil, not only cohesion and adhesion, but also friction of the soils with the tools and the weight of a unit volume of the soil must be considered. The force with which the particles of soil cling to each other (cohere) is of prime importance in connection with cultivation of the soil, since the ease or difficulty with which tools penetrate the soil, and hence the labour required to cultivate the soil, depends primarily upon it. The controlling influence of cohesion may be inferred from the fact that it is the main factor determining the differences between soils, although the other properties of soils should also be taken into account, since the resistance to be overcome in cultivation is always due in part to them. In general, it may be said that humus offers the least resistance to cultivation, clay the greatest, while sand stands between the two extremes.

If it be asked what practical means should be used to reduce to a minimum the labour of working soils, we should recommend a suitable change in composition of the soil as the first step. Thus, for example, mixing clay with sand diminishes both cohesion and adhesion of the soil, and renders it more easy to cultivate. It is true that by this treatment both the weight and friction of clay are increased, but, as modifications of cohesion and adhesion are more far-reaching, the increase in weight and friction may be neglected.

The improvement of the tillable properties of soils may be most perfectly attained by an increase in the proportion of humus. The working of clayey soil is by this means rendered very much less laborious, because both cohesion and adhesion, and also the weight, are diminished in proportion to the amount of humus added. For sandy soils also an increase of humus is of advantage, as it reduces friction and decreases the weight. It thus appears that manuring with materials of organic origin (stable manure, vegetable matter, straw, and peat) greatly increases the ease of cultivation, and at the same time influences most favourably the chemical properties of the soil in many different ways. Nor should the fact be overlooked that increasing the humus content promotes the tendency of the soil to assume the 'crumbly' structure, and by this means still further reduces the mechanical resistance to cultivation. Soils of crumbly structure are not only naturally more fertile, but are very much more easily worked than those having a separate grain structure. Whatever manipulations, therefore, promote the formation of the crumbly structure and tend to make such structure permanent are of great value in soil cultivation, inasmuch as they both heighten the fertility of the soil and lessen the labour required for its cultivation. This is especially true of compact, heavy soils. To obtain this crumbly structure and to preserve it, several fundamental principles must be observed. These may be summed up briefly as follows: (1) The soil must be ploughed immediately after the crop has been gathered; (2) it

ust be ploughed only when it contains a medium amount of water (about 40 per cent. of that which the soil is capable of holding); (3) the furrows must be as narrow as possible, especially at the first ploughing; (4) the land destined for tillage in spring should be exposed in roughly ploughed condition to the action of frosts during the winter; and (5) the formation of aggregates in the soil should be promoted by means of proper fertilisers. For the latter purpose humus-forming manures (stable and vegetable manure) as well as calcium hydrate (freshly slaked lime) are especially valuable. Hurtful influences, on the other hand, are exerted by such fertilisers as contain carbonates of the alkalis and soluble phosphates, inasmuch as these when applied in considerable quantities cause the soil particles to pack closely together. The same is true of materials rich in chlorides and nitrates. These salts promote the formation of crumbly structure while they remain in the soil, but when they are washed out by the rain water, they leave the soil in a puddled condition. This happens more or less with all salts which are not fixed by the soil. This can be corrected only by a careful selection and application of measures calculated to increase and preserve the percentage of humus in the soil.

From the standpoint of the agriculturist, the principal property of soils in their relation to air is permeability, for on it depends the supply of oxygen required both for normal decomposition of organic material and for the respiration of the roots. The smaller and more densely packed the soil particles, the more limited the supply of oxygen and the greater the necessity for attempting to regulate the permeability. This end is best attained by mixing a fine-grained soil with sand and by inducing a crumbly structure. If too great humidity of the soil is responsible for the lack of permeability, only thorough drainage can correct the defect. If the soil has been deprived of its permeability by washing during periods of extraordinarily heavy precipitation, the best remedies are harrowing and hoeing between the rows, and heaping up the soil around the plants. The latter is a most efficient means of increasing permeability of the soil.

Excess of water, either temporary or permanent, is hurtful to plant growth to a greater or less extent. Such a condition is a result principally of heavy precipitation on soils of high water capacity. The damage is most marked in the case of basin-shaped fields on which water from neighbouring fields accumulates, or which have an impervious subsoil at such a depth that the soil is kept in a state of saturation. The means adopted to correct this state of affairs will depend upon whether there is a permanent or only temporary excess of water. If the excess of water remains permanently or for a long period, it can be removed only by under-drainage or by the construction of ditches. The physical structure of the soil, more particularly its permeability and water capacity, determines the amount of water that may be removed by this means. The efficiency of the method consequently varies widely in different localities. A blind adherence to the common rules of drainage may in some cases reduce the water supply in the soil to a degree dangerous to plant growth. This is the case (1) in all soils of small water capacity and considerable permeability (coarse-grained, sandy soils); (2) in soils offering considerable facilities for evaporation (peat and bog earth); and (3) in all soils occupied by plants requiring considerable amount of moisture in the upper soil layer (meadows, perennial forage plants.)—*Royal Agricultural Society's Journal.*

(*To be continued.*)

ON THE FORESTS AND WASTE LANDS OF CEYLON.*

By A. F. Broun, Esq.,
Conservator of Forests.

The area of uncultivated land in Ceylon exceeds 20,000 of the 25,365 square miles of country contained within the Colony. The proportion of good forest in these 20,000 square miles is unfortunately small, the largest portion being taken up by scrub and by grass-covered stretches of country called *patanas*, which find their greatest developement in the hills of the Province of Uva. The scrub is partly natural, especially so on the sea coast and in the arid subzone, and partly the result of a destructive method of cultivation known as *Chena*, and which consists in clearing and burning jungle and in raising crops for two or three years on the area cultivated. Now that a careful control is exercised over this cultivation, nothing but small forest is felled; but not many years ago valuable forests were ruthlessly felled, and their ashes were utilised as manure for the crops which were raised; where such a system of cultivation has been in force, it takes years for the forest to take again a useful character. Usually a thorny scrub grows up, or as is the case in the Eastern Province, a dense growth of thick grass (*Imperata arundinacea*) springs up, as in the moist districts, the group gets covered up with *Lantana*, or, worse, because they are not soil improvers, by *Hedyotis*, *Ochlandra stridulata* or *Gleichenia linearis*.

* From the fifth volume of Trimen's Flora of Ceylon.

The patanas were probably at one time covered with trees, such as will be described later on for the Park country, but fires and grazing have destroyed the majority of these, except in sheltered places such as gullies or ravines. The trees which are to be found on the patanas are, at higher elevations, *Rhododendron arboreum*, and from 4,000 feet downwards, *Careya arboreas* known in Ceylon as 'Patana Oak,' *Phyllanthu, emblica*, *Terminalia belerica*, *T. chebula*, and *Pterocarpus marsupicum*. These are, with few exceptions, the only trees which can stand the heavy grass fires; but in the gullies, where they are more sheltered, other species, which are less robust and which are same as those found in forests at the same elevation, are able to live and to produce themselves.

In the backward state of the survey of the Island it is not yet possible to state the area of the real forests, but they cannot much exceed 5,000 square miles, although the larger area is, for the present, set aside for reservation, which includes stretches of scrub and patana englobed

within the forests. The most important belt of forest stretches from the Northern Province, mostly between the centre line of the Island and the east coast down to the Hambantota district, but important blocks are also found scattered over the rest of the Island, chiefly in the Puttalam district of the North-Western Province and in the upper hills, but also in the Kurunegala district of the North-Western Province, in the Western, Southern, and Sabaragamuwa Provinces, where are still to be found, in isolated blocks, the remains of what was at one time the extensive Singha Raja Forest.

The vegetation of the forests varies especially according to rainfall and elevation, and the forests can be classified according to the following zones and subzones:—

Dry Zones. Rainfall 35 to 70 inches.	Arid zone. Rainfall 35 to 50 in. Dry zone proper. Rainfall 50 to 70 inches.
Intermediate zone.	Rainfall 70 to 80 inches.
Wet Zone. Rainfall 80 in. and more.	Lowcountry zone from sea level to 4,000 feet. Mountain zone above 4,000 feet.

The Dry Zone.—This includes about three-fifths of the island, viz., the whole of the Northern, North-Central, and Eastern Provinces, the Puttalam district and portion of the Kurunegala and Chilaw districts, the North-Western Province, the northern part of the Central Province, about two-thirds of the Province of Uva, the Hambantota district of the Southern Province, and the Kolonna Korale of the province of Sabaragaumwa. The Western Province is therefore the only one of which no portion enters in the dry zone.

The Arid Zone occupies the north-western end of the island in the Puttalam, Mannar and Jaffna districts, and the south-eastern in the Hambantota district. The characteristic trees and shrubs of this subzone are *Salvadora persica*, *Azima tetracantha*, and *Acacia eburnea* near the coast, and *Acacia planifrus* on the island of Mannar. The woody vegetation is usually shrubby and thorny, being represented by *Carissa opinosum*, *Zizyphus jujuba*, *Z. Œnoplia*, *Z. rugosa*, *Randia dumetorum*, *Flacourtia pamontchi*, &c. Further from the coast the forest vegetation is composed of the same species as of the forests of the dry zone proper, but the trees are usually smaller and the undergrowth is composed mainly of *Memecylon* and of *Stenosiphonium rulyseinaum.* The Palmyra palm (*Borassus flabelliformisi*) is found on sandy soil both in this sub-districts, especially in the Jaffna Peninsula.

The forests of the *Dry Zone proper* are the most important to the forester, not only because they are the most extensive, but also because they contain most of the valuable timber trees. The most important of these are satinwood (*Chloroxylon swietenia*) found on sandy soils, and attaining its best dimensions in the Puttalam and Batticaloa districts; Ebony (*Diospyros ebenum*), which prefers rocky, undulating ground, and which, although found occasionally in the wet, lowcountry, is almost abundant in the Northern, North-Central, and North-Western Provinces, and in the Trincomalee and Matale districts; Palu (*Mimusops hexandra*), which is found on more clayey soils from the North to the South of the Island. It attains an enormous size, and grows best, if anywhere, in the Northern Province. It is one of the iron woods of commerce. Trincomalee wood (*Berrya Ammonilla*) is found in moist but well-drained places. It extends into part of the wet zone, but the trees are usually small size. The finest trees are found in the eastern portion of the Province of Uva. Milla (*Vitex altissima*) one of the strongest of Ceylon timbers, extends also into the wet zone, where it is not uncommon; but, like the Berrya, it is a much finer tree in the dry zone, especially in the Eastern Province. The same may be said of Ranai (*Alseodaphne semecarpifolia*), although it is not so common in the wet zone as milla. The Ebenaceæ are (apart from Ebony) represented in this zone chiefly by *D. ovalifolia*, while *D. crumenata*, *D. Oocarpa*, *D. embrejopteris* and *D. montana* are also found abundant in certain localities; and *Maba buxifolia* is a very small tree which is by no means uncommon even in the arid zone. Of the Guttiferæ we have chiefly *Garcinia spicata*, *Calophyllum burmani*, and, near streams or in groves, planted before the memory of man, *Mesua ferra.* The Dipterocarps, which are so characteristic of the lowcountry wet zone are almost absent, being only represented by *Vatica obscura* in moist soils in the Eastern Province, and by *Hopea cordifolia* along streams in Southern Uva and Sabaragamuwa. Among trees which are characteristic of this zone the most common are *Polyalthia longifolia*, *P. coffæoides*, *Crateeva Roxburghii Pterospermum suberifolium*, *Sterculia fœtida*, *Azadirachta indica*, *Walsura piscidia*, *Pleurostylia Wightii*, *Sehleichera trijga*, *Nephelium longana*, *Odina Wodier*, *Cassia fistula*, *C. marginata*. *Bauhinia tomentosa*, *Acacia leucophloea*, *Acacia ferruginea*, *Gyrocarpus Jacquini*, *Eugenia jambolana*, *Barringtonia acutangula*, *Adina cordifolia*, *Canthium didegnum*, *Bassia longifolia*, *Terminalia fabra* (near streams and tanks), *Strychnos Nux vomica*, *Cordia Rothii*, *Stereospermum chelonioides*, *Euphorbia antiquoreum* *Sapium insigne*, *Hemicyclia sepiaria*, *Miechodon zeylanicus*, *Holoptelea integrifolia*, &c.

The most common shrubs are *Polyalthia korinti*, *Allophyllus cobbe*, *Oihna squarrosa*, *Cassia auriculata*, *Alangium Lamarchii*, *Webera corymbosa*, *Raudia dumetorum*, *Gmelina asiatica*, *Memecylon*, *Glycosmis pentaphylla*, and *Dimorphocalyx fabellus.* Creepers and climbers are not so well represented as in the moisture zones, the most abundant being *Hugonia mystax*, *Ventilago maderaspatana*, some species of *Vitis*, *Derris scandens*, *D. sinnata*, &c. The most beautiful orchids found in this zone are, without doubt, *Saccolabrium guttatrun*, which is found in the Eastern Province, and *Vanda Roxburghii* and *V. spathulata*, which are found chiefly not far from the sea. *Vanda parviflora* and *Saccolabrium Wightianum* are not uncommon, while a pretty little white ground orchid, *Habenaria pterocarpa*, is found in the rocky places. The ferns of this zone are not abundant, the *Adiantum candatum* penetrating farther into the dry districts than any other, while *Hemionitis arifolia* and *Gymnopteris quercifolia* are found in dark and moist places, while on rocks grow *Cheilanthes mysorensis*, *C. loxa* and the tiny *Ophioglossum lusitanicum.*

In the Intermediate zone trees of both the dry and the lowcountry moist zone are to be found, such as *Berrya ammonilla*, *Nephelium longana*,

Mesu ferrea, Artocarpus integrifolia. Xylopia parviflora, Albizzia stipulata, A. odoratissima, A. lebbek, &c; and there are a few species which although they are found elsewhere, can be said to be characteristic; these are *Filicium decipiens, Chickrassia tabularis,* and *Melia dubia. Terminalia belerica* attains an extraordinary size in this zone, in which are other gigantic trees like *Tetrameles nudiflora* and *Ailanthus malabarica.* Among the shrubs, *Vitex negundo* is probably the most characteristic. Another characteristic feature of this zone is the great abundance of creepers which cover the tallest trees and render forest operations extremely difficult. Some very handsome ferns grow in this zone, the most noticeable being *Aspidium decurrens, A. subtriphyllum, A. cicutarium,* and *Adiantum lumulatrun.*

The Park country of Uva can be included in this zone. It comprises the low lands of the eastern boundary of that province; and it has a quite characteristic flora, very similar to that of the Sub-Himalayan forests. The trees which are found here are found only on the patanas and occasionally elsewhere, the most noteworthy being *Anogeissus latifolia, Butea frondosa. Terminalia chebula, T. belerica, Zizyphus xylopyra, Pterocarpus marsupium, Miliusa indica, Sterculia colorata, Gmelina arborea* and *Diospyros melanoxylon.* The undergrowth is, as in the Sub-Himalayan forests, mostly grass (*Imperata arundinacea*). Near water-courses the flora is that of the ordinary dry zone type.

The Wet zone includes the Western Province, the Province of Sabaragamuwa excluding the Kolonna Korale, the Galle and Matara districts of the Southern Province, the Hill districts of the Central and Uva Provinces and about one-half of the Kurunegala and Chilaw districts of the north-western Province, or, in a few words, the south-western and south-central portions of the island. It is the portion which receives the full force of the South-west monsoon, and includes the higher lands affected by the North-east monsoon. The rainfall usually ranges from 80 to 200 inches, but it exceeds even this in some places, and rumour has it that in Eratne, to the South-west of Adam's Peak, it actually does not fall far short of 400 inches.

(*To be continued.*)

GENERAL ITEMS.

The *Queensland Agricultural Journal* gives a correspondent the following recipe for making a concrete "milk yard":—"The concrete should be made as follows—1 part cement, 4 parts gravel (the gravel should contain naturally enough sand for the purpose), 2 parts broken metal or stone (not over 2 inches cubic): but all gravel (that is 6 parts) will do as well as if, not better than stone. Fine sand should not be used under any conditions. The floor should be kept well wetted for several days after laying down. The concrete may be laid on the surface of the ground as it is better not to break the crust."

We are informed in the same Journal that an American chemist is said to have discovered a process by which Alexandria limestone can be converted into a substance resembling wool, the threads of which are strong enough to admit of their being woven. The staple is, however, too short for the purpose. But the product has evidently a commercial value, as we are told that it is in extensive use for packing round refrigerators, boiler cases, and pipes to preserve the heat in the latter case. It is also used for deadening the sound on floors, and large quantities are being regularly shipped to the Phillippine Islands, to be used as a non-conductor in the storehouses of the American troops.

Thomas Barraclough of 20, Bucklersburg Road, London, E.C., advertises in the *Planter* (Calcutta) Fames' Patent Rhea Fibre Extractor, stating that it produces in one operation 160 to 200 lbs. of clean fibre daily from the green stems—value £30 to £35 according to state of the market. Weighs net 11 cwt., gross 14½ cwt., requires one horsepower.

We read in the *Indian Agriculturist* that Messrs. Thirkell & Co. of Fenchurch Street have written to the Curator of the Indian Section in the Imperial Institute to say that they are prepared to take all the rhea ribbons that India can produce for some years for £15 per ton, and that its offer to supply, at £40, decorticators which are capable of preparing 10 cwt. of stuff per day. Government has been asked to foster the cultivation of rhea as much as possible. In forwarding the correspondence on the subject to the Bengal Chamber of Commerce, Dr. Watt, reporter on economic products to the Government of India, shews that Messrs. Thirkell & Co. require the ribbons in the crudest form.

Some idea of the financial results achieved by the Indian Forest Department may be informed by the fact, recorded in Mr. Ribbenhop's pamphlet, "Foresty in India," that rheas in the period 1864 to 1867, the annual surplus was about fourteen lacs; it has now reached eight lacs.

In his sketch of the History of Indian Botany, Sir George King incidentally mentions that from bamboos a very large amount of forest revenue is annually derived. The sale of bamboos for the year 1896-97 amounted to no less than 110 milions of stems.